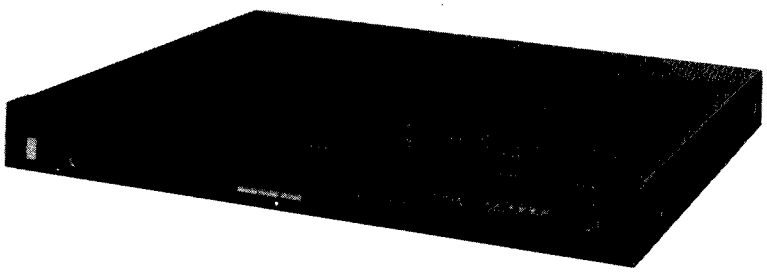
ORDER NO. SD81092032C8

Service Manual

Stereo DC Power Amplifier

SE-A7(K)

[D],[EW],[EG],[EK],[EF],
[EH],[EB],[Ei],[XA],[XL]



* The black type model is provided with (K) in the Service Manual. SE-A7(K)
* The colors of this model is black type only.

English

Areas

* [D] is available in Scandinavia.
* [EW] is available in Switzerland.
* [EG] is available in F.R. Germany.
* [EK] is available in United Kingdom.
* [EF] is available in France.
* [EH] is available in Holland.
* [EB] is available in Belgium.
* [Ei] is available in Italy.
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
* [XL] is available in Australia.

Specifications

(Specifications are subject to change without notice for further improvement.)

(DIN 45 500)

■ AMPLIFIER SECTION

20 Hz~20 kHz continuous power output	
stereo operation	
both channels driven	2 × 60W (4Ω)
	2 × 60W (8Ω)
monaural (BTL) operation	120W (8Ω)
40 Hz~16 kHz continuous power output	
stereo operation	
both channels driven	2 × 60W (4Ω)
	2 × 60W (8Ω)
monaural (BTL) operation	120W (8Ω)
1 kHz continuous power output	
stereo operation	
both channels driven	2 × 75W (4Ω)
	2 × 65W (8Ω)
monaural (BTL) operation	150W (8Ω)
Total harmonic distortion	
rated power at 20 Hz~20 kHz	
stereo operation	0.007% (4Ω)
	0.003% (8Ω)
monaural (BTL) operation	0.007% (8Ω)
rated power at 40 Hz~16 kHz	
stereo operation	0.007% (4Ω)
	0.003% (8Ω)
monaural (BTL) operation	0.007% (8Ω)
rated power at 1 kHz	
stereo operation	0.007% (4Ω)
	0.003% (8Ω)
monaural (BTL) operation	0.007% (8Ω)
half power at 20 Hz~20 kHz	0.0015% (8Ω)
half power at 1 kHz	0.0006% (8Ω)
−26 dB power at 1 kHz	0.03% (4Ω)
50 mW power at 1 kHz	0.03% (4Ω)
Intermodulation distortion	
rated power at 250 Hz: 8 kHz=4:1, 4Ω	0.007%
rated power at 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0.003%
TIM (Transient Intermodulation Distortion)	unmeasurably small
Power bandwidth	
both channels driven, −3 dB	5 Hz~70 kHz (0.02%)
Residual hum and noise	0.2 mV
Damping factor	50 (4Ω), 100 (8Ω)
Input sensitivity and impedance	1 V/47kΩ
S/N	100 dB (110 dB, IHF, A)
Frequency response	20 Hz~20 kHz, +0 dB, −0.1 dB
	0.7 Hz~200 kHz, −3 dB
Channel balance, 250 Hz~6,300 Hz	±1 dB
Channel separation, 1 kHz	65 dB
Headphones output level and impedance	520 mV/330Ω
Load impedance	
stereo operation	
MAIN or REMOTE	4Ω~16Ω
MAIN and REMOTE	8Ω~16Ω
monaural	
MAIN or REMOTE	8Ω~16Ω

■ GENERAL

Power consumption	420W
Power supply	AC 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensions (W×H×D)	430 × 53 × 365 mm
	(16-15/16" × 2-3/32" × 14-3/8")
Weight	9.8 kg
	(21.6 lb.)

Note:
Total harmonic distortion is measured by the digital spectrum analyzer (H.P. 3045 system).

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Deutsch

TECHNISCHE DATEN (Spezifikationen Können infolge von Verbesserungen ohne Ankündigung geändert werden.)

(DIN 45 500)

■ VERSTÄRKERTEIL

Dauerton-Ausgangsleistung bei 20 Hz ~ 20 kHz
stereo
beide Kanäle ausgesteuert 2 × 60W (4 Ω)
2 × 60W (8 Ω)
mono (BTL) 120W (8 Ω)
Dauerton-Ausgangsleistung bei 40 Hz ~ 16 kHz
stereo
beide Kanäle ausgesteuert 2 × 60W (4 Ω)
2 × 60W (8 Ω)
mono (BTL) 120W (8 Ω)
Dauerton-Ausgangsleistung bei 1 kHz
stereo
beide Kanäle ausgesteuert 2 × 75W (4 Ω)
2 × 65W (8 Ω)
mono (BTL) 150W (8 Ω)
Gesamtklirrfaktor
Nennleistung bei 20 Hz ~ 20 kHz
stereo 0,007% (4 Ω)
0,003% (8 Ω)
mono (BTL) 0,007% (8 Ω)
Nennleistung bei 40 Hz ~ 16 kHz
stereo 0,007% (4 Ω)
0,003% (8 Ω)
mono (BTL) 0,007% (8 Ω)
Nennleistung bei 1 kHz
stereo 0,007% (4 Ω)
0,003% (8 Ω)
mono (BTL) 0,007% (8 Ω)
halbe Nennleistung bei 20 Hz ~ 20 kHz 0,0015% (8 Ω)
halbe Nennleistung bei 1 kHz 0,0006% (8 Ω)
−26 dB Leistung bei 1 kHz 0,03% (4 Ω)
50 mW Leistung bei 1 kHz 0,03% (4 Ω)
Intermodulationsfaktor
Nennleistung bei 250 Hz: 8 kHz = 4:1, 4 Ω 0,007%
Nennleistung bei 60 Hz: 7 kHz = 4:1, nach SMPTE, 8 Ω 0,003%
TIM (Intermodulationsverzerrung) unmeßbar
Leistungsbandbreite
beide Kanäle ausgesteuert bei −3 dB 5 Hz ~ 70 kHz (0,02%)
Restbrumm und Geräusch 0,2 mV
Dämpfungsfaktor 50 (4 Ω), 100 (8 Ω)
Eingangsempfindlichkeit und -impedanz 1 V/47 kΩ
Geräuschabstand 100 dB (110 dB nach IHF, A)
Frequenzgang 20 Hz ~ 20 kHz, +0 dB, −0,1 dB
0,7 Hz ~ 200 kHz, −3 dB
Kanalabweichung (250 Hz ~ 6300 Hz) ±1 dB
Übersprechdämpfung (1 kHz) 65 dB
Kopfhörerpegel und -impedanz 520 mV/330 Ω
Lautsprecherimpedanz
stereo
MAIN oder REMOTE 4 Ω ~ 16 Ω
MAIN und REMOTE 8 Ω ~ 16 Ω
mono
MAIN oder REMOTE 8 Ω ~ 16 Ω

■ ALLGEMEINE DATEN

Leistungsaufnahme 420 W
Netzspannung
Wechselstrom 50 Hz/60 Hz, 110V/120V/220V/240V
Abmessungen (B×H×T) 430 × 53 × 365 mm
Gewicht 9,8 kg

Bemerkung:
Der Gesamtklirrfaktor wurde mit einem digitalen Rauschspektrometer (Anlage H.P. 3045) gemessen.

Français

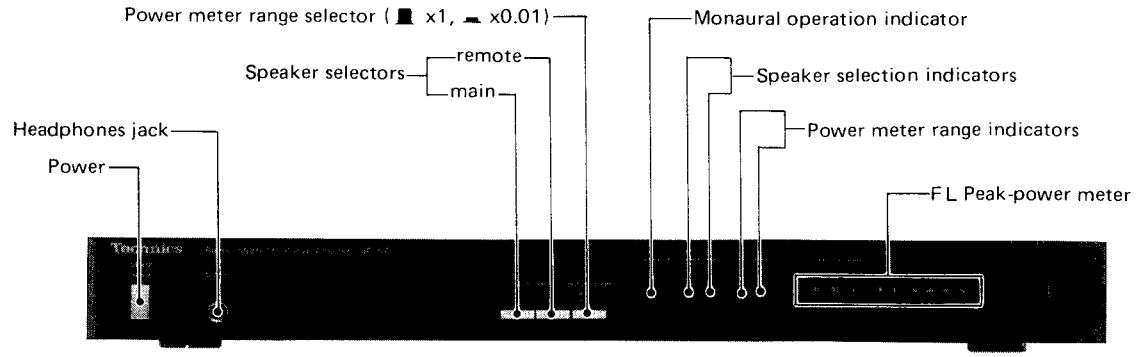
CARACTERISTIQUES (Sujet á changement sans préaris.)

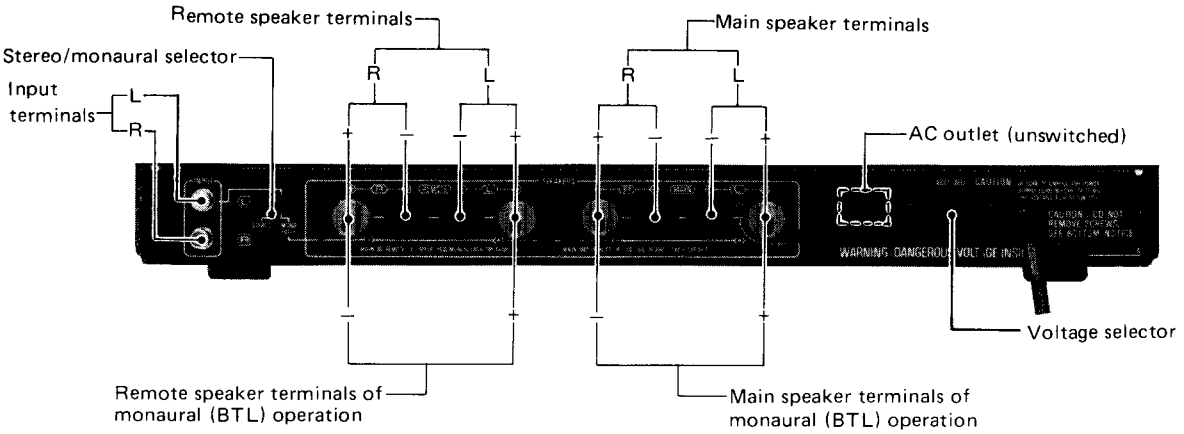
(DIN 45 500)

■ SECTION AMPLIFICATEUR

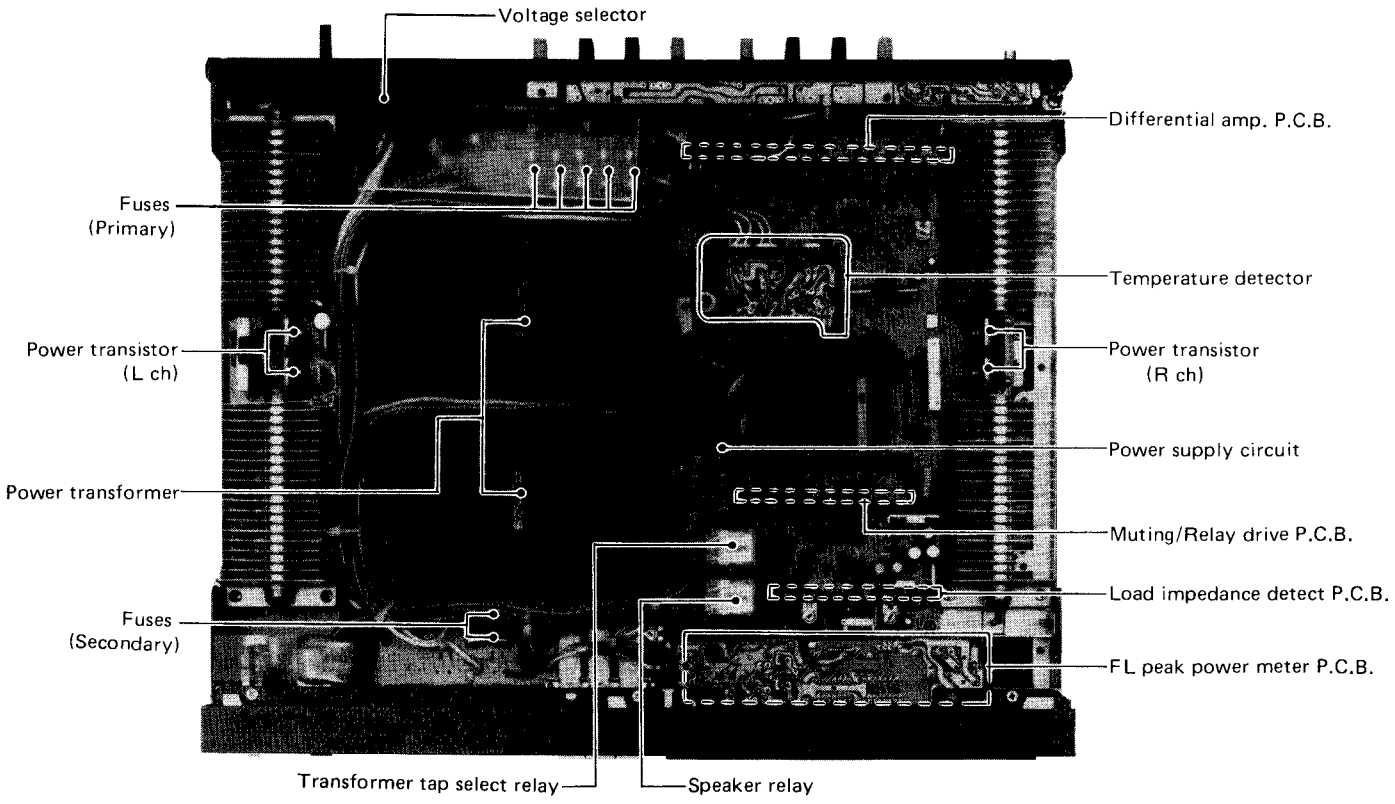
Puissance de sortie continue de 20 Hz~20 kHz,
stereo
les deux canaux en circuit 2 × 60W (4Ω)
2 × 60W (8Ω)
mono (BTL) 120W (8Ω)
Puissance de sortie continue de 40 Hz~16 kHz,
stereo
les deux canaux en circuit 2 × 60W (4Ω)
2 × 60W (8Ω)
mono (BTL) 120W (8Ω)
Puissance de sortie continue à 1 kHz
stereo
les deux canaux en circuit 2 × 75W (4Ω)
2 × 65W (8Ω)
mono (BTL) 150W (8Ω)
Distorsion harmonique totale
à puissance nominale (20 Hz~20 kHz)
stereo 0,007% (4Ω)
0,003% (8Ω)
mono (BTL) 0,007% (8Ω)
à puissance nominale (40 Hz~16 kHz)
stereo 0,007% (4Ω)
0,003% (8Ω)
mono (BTL) 0,007% (8Ω)
à puissance nominale (1 kHz)
stereo 0,007% (4Ω)
0,003% (8Ω)
mono (BTL) 0,007% (8Ω)
à demi-puissance (20 Hz~20 kHz) 0,0015% (8Ω)
à demi-puissance (1 kHz) 0,0006% (8Ω)
puissance de −26 dB à 1 kHz 0,03% (4Ω)
puissance de 50 mW à 1 kHz 0,03% (4Ω)
Distorsion d'intermodulation
à puissance nominale à 250 Hz: 8 kHz=4:1, 4Ω 0,007%
à puissance nominale à 60 Hz: 7 kHz=4:1, SMPTE, 8Ω 0,003%
TIM (distorsion d'intermodulation transitoire) infiniment petite
Réponse de fréquences
les deux canaux en circuit, −3 dB 5 Hz~70 kHz (0,02%)
Bruit et ronflement résiduels 0,2 mV
Coefficient d'amortissement 50 (4Ω), 100 (8Ω)
Sensibilité et impédance d'entrée 1 V/47kΩ
Signal/Bruit 100 dB (110 dB, IHF, A)
Réponse de fréquence 20 Hz~20 kHz, + 0 dB, −0,1 dB
0,7 Hz~200 kHz, −3 dB
Equilibrage des canaux, 250 Hz~6,300 Hz ±1 dB
Séparation des canaux, 1 kHz 65 dB
Niveau de sortie des casques et impédance 520 mV/330Ω
Impédance de charge
stereo
PRINCIPALE ou AUXILIAIRE (MAIN or REMOTE) 4Ω~16Ω
PRINCIPALE et AUXILIAIRE (MAIN and REMOTE) 8Ω~16Ω
mono
PRINCIPALE ouAUXILIAIRE (MAIN or REMOTE) 8Ω~16Ω

■ LOCATION OF CONTROLS





*** The product for destination [XA] is equipped with AC outlet.**



Français

■ DIVERS

Consommation	420W
Alimentation	CA 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensions (L× H× Pr)	430 × 53 × 365 mm
Poids	9,8 kg

Remarque:
On mesure la distorsion harmonique totale au moyen d'un analyseur de spectre digital (Système H.P. 3045).

Español

ESPECIFICACIONES (Estas especificaciones están sujetas a cualquier cambio sin previo eviso.)

(DIN 45 500)

■ SECCION AMPLIFICADOR

Potencia continua de 20 Hz~20 kHz	
stereo	
en ambos canales	2 × 60W (4Ω)
	2 × 60W (8Ω)
mono (BTL)	120W (8Ω)
Potencia continua de 40 Hz~16 kHz	
stereo	
en ambos canales	2 × 60W (4Ω)
	2 × 60W (8Ω)
mono (BTL)	120W (8Ω)
Potencia continua de 1 kHz	
stereo	
en ambos canales	2 × 75W (4Ω)
	2 × 65W (8Ω)
mono (BTL)	150W (8Ω)
Distorsión armónica total	
potencia de régimen a 20 Hz~20 kHz	
stereo	0,007% (4Ω)
	0,003% (8Ω)
mono (BTL)	0,007% (8Ω)
potencia de régimen a 40 Hz~16 kHz	
stereo	0,007% (4Ω)
	0,003% (8Ω)
mono (BTL)	0,007% (8Ω)
potencia de régimen a 1 kHz	
stereo	0,007% (4Ω)
	0,003% (8Ω)
mono (BTL)	0,007% (8Ω)
mitad de potencia a 20 Hz~20 kHz	0,0015% (8Ω)
mitad de potencia a 1 kHz	0,0006% (8Ω)
−26 dB de potencia a 1 kHz	0,03% (4Ω)
50 mW de potencia a 1 kHz	0,03% (4Ω)
Distorsión por intermodulación	
potencia de régimen a 250 Hz: 8 kHz=4:1, 4Ω	0,007%
potencia de régimen a 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0,003%
TIM (distorción intermodular transitoria)	insignificante
Ancho de banda de potencia	
con ambos canales, −3 dB	5 Hz~70 kHz (0,02%)
Zumbido residual y ruido	0,2 mV
Factor de amortiguamiento	50 (4Ω), 100 (8Ω)
Sensibilidad e impedancia de entrada	1V/47kΩ
Relación de señal a ruido	100 dB (110 dB, IHF, A)
Respuesta de frecuencia	20 Hz~20 kHz, +0 dB, −0,1 dB
	0,7 Hz~200 kHz, −3 dB
Equilibrio de canales, 250 Hz a 6,300 Hz	±1 dB
Separación de canales, 1 kHz	65 dB
Impedancia y nivel de salida de los auriculares	520 mV/330Ω
Impedancia de carga	
stereo	
MAIN o REMOTE	4Ω~16Ω
MAIN y REMOTE	8Ω~16Ω
mono	
MAIN o REMOTE	8Ω~16Ω

■ GENERAL

Consumo de energía	420W
Alimentación de energía	CA 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensiones (An.× Al.× Prof.)	430 × 53 × 365 mm
Peso	9,8 kg

Nota:
La distorsión armónica total se mide con el analizador de espectro digital (sistema H.P. 3045).

■ PROTECTION CIRCUITRY

The protection circuitry may have operated if either of the following conditions are noticed:

- No sound is heard when the power is turned on.
- Sound stops during a performance.

The function of this circuitry is to prevent circuitry damage if, for example, the positive and negative speaker connection wires are "shorted", or if speaker systems with an impedance less than the indicated rated impedance of this unit are used.

If this occurs, follow the procedure outlined below:

1. Turn off the power.
2. Determine the cause of the problem and correct it.
3. Turn on the power once again.

Note:

When the protection circuitry functions, the unit will not operate unless the power is first turned off and then on again.

■ CONTENTS

	Page
LOCATION OF CONTROLS	4
TECHNICAL GUIDES	5 ~ 7
DISASSEMBLY INSTRUCTIONS	8 ~ 10
BEFORE REPAIR AND ADJUSTMENT	10
ADJUSTMENT POINTS	11
MEASUREMENTS AND ADJUSTMENTS (English)	12, 13
MESSUNGEN UND JUSTIERUNGEN (Deutsch)	13, 14
MESURAGES ET REGLAGES (Français)	15, 16
MEDICIONES Y AJUSTES (Español)	16, 17
REPLACEMENT PARTS LIST (Electrical Parts)	18, 28
BLOCK DIAGRAM	19, 20
CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM	21, 22
SCHEMATIC DIAGRAM	23 ~ 27
EXPLODED VIEW	30, 31
REPLACEMENT PARTS LIST (Cabinet & Chassis)	32

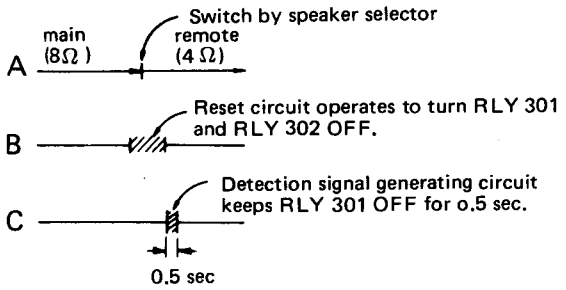
■ TECHNICAL GUIDES

1. SPEAKER IMPEDANCE DETECTION CIRCUIT

This circuit detects the impedance of the speaker connected to the speaker terminal and serves to keep the operation of the unit in best conditions, controlling the constant voltage power supply circuit. It consists of a "**voltage comparing circuit**", "**reset circuit**", "**detection signal generating circuit**" and "**relay drive circuit**".

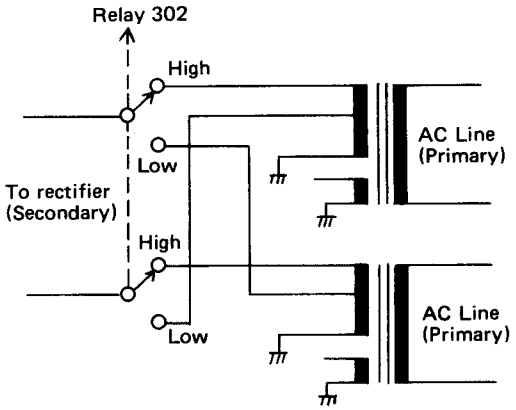
① Basic principles

The built-in reset switch is short-circuited only for a moment when speaker selector is operated. (Fig. 1-A) Simultaneously, the reset circuit operates (Fig. 1-B) to turn both RLY 301 and RLY 302 OFF. Subsequently, the reset switch opens at the end of operating the speaker selector. Then, the detection signal generating circuit keeps RLY 301 OFF for 0.5 second more. (Fig. 1-C) Since RLY 301 is OFF, the speaker connected to speaker terminal contacts with the voltage comparing circuit. The difference from the reference voltage, that is, the type of speaker connected, is detected; and the secondary side tap voltage of the power transformer is switched by RLY 301 so that the voltage matches the connected speaker.



(Operation time of each circuit)

Fig. 1



(Power transformer)

Fig. 2

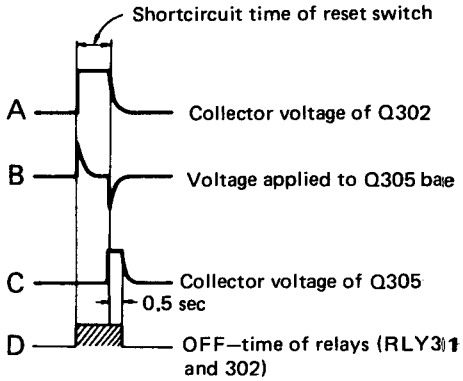
② Reset circuit and detection signal generating circuit

As already explained, when the reset switch is short-circuited, Q302 in the reset circuit turns ON. Positive voltage is generated at the collector of Q302 as shown in Fig. 3-A, causing Q306 in the relay drive circuit [I] to turn ON. (But, the base of Q306 is usually at 0 volt and OFF.)

When Q306 turns ON, the base of Q307 is grounded and turns OFF, causing RLY 301 to turn OFF. Also, the collector voltage of Q307 becomes positive, causing Q301 as well as RLY 302 to turn OFF. (Q307 emitter is connected to pin ⑥ of IC201 and the voltage of this pin is usually zero or a little positive.) In other words, RLY 301 and RLY 302 are OFF while the reset switch is short-circuited.

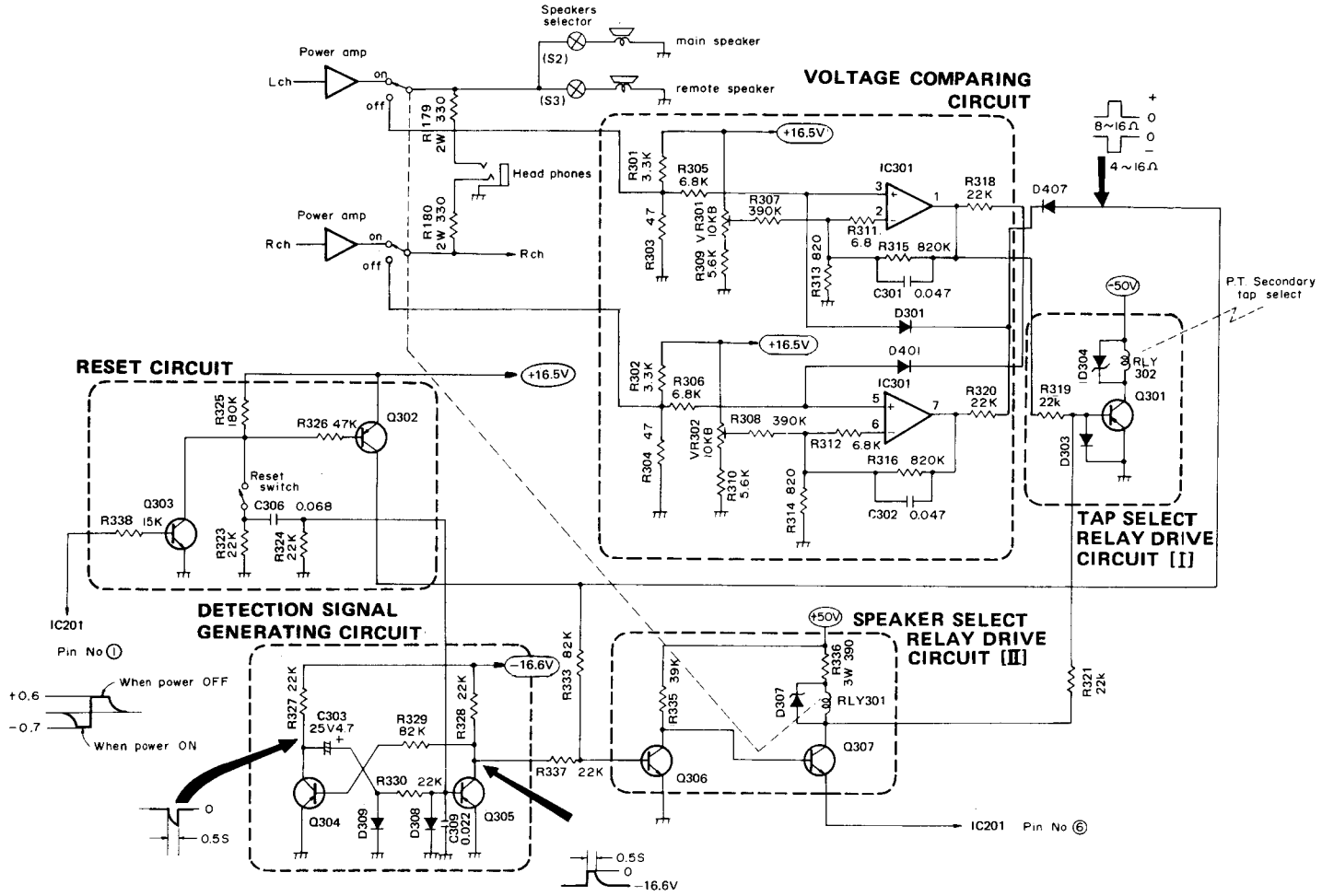
Also, at the moment when the reset switch opens, the voltage as in Fig. 3-B is applied to the base of Q305 in the detection signal generating circuit which uses a multi-vibrator due to the charge and discharge of C306, thus causing this transistor to turn ON.

And voltage as in Fig. 3-C is generated at the collector. The voltage in Fig. 3-C turns Q306 ON, and Q307 OFF, therefore both RLY 301 and RLY 302 turn OFF. RLY 301 and RLY 402 are OFF for 0.5 second. That is, RLY 301 and RLY 302 are turned OFF during shortcircuit of the reset switch and for 0.5 sec. more after opening of the switch.



(Voltage generated at each terminal)

Fig. 3



(Speaker impedance detection circuit)

Fig. 4

③ Voltage comparing circuit

While the relay (RLY302) is OFF, the speaker is in contact with the voltage comparing circuit. (Fig. 5)

The reference voltage is applied to the negative input terminal of operation amplifier (IC301), and the voltage of positive input terminal varies depending on the speaker impedance as shown in Fig. 5. The alteration of voltage is directly related with the output of operation amplifier. Usually the unit is adjusted so that the output voltage is zero with 6Ω speaker connected, and the output voltage of operation amplifier becomes negative with 4Ω speaker connected, and the output voltage becomes positive with 8Ω speaker connected. Only when the voltage is negative, Q301 and RLY 302 turn ON, switching the secondary side tap voltage of power transformer to 32.0V.

Incidentally, when 8Ω speaker is connected to Rch and 4Ω to Lch, negative voltage is generated.

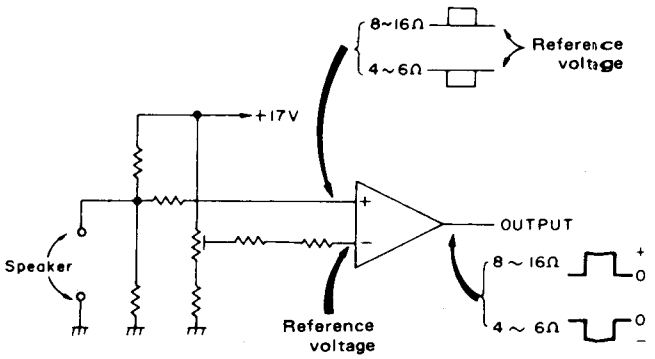


Fig. 5

④ Voltage comparing circuit and reset circuit

The operation amplifier of **"voltage comparing circuit"** holds the detected impedance 8Ω or 4Ω. **Therefore, if a speaker of different impedance is connected, it is necessary to turn off the power supply or switch the speaker selector and to operate the reset circuit. That is, the relays (RLY301 and 302) must be turned OFF.** The base of Q303 in the reset circuit is connected to pin ① of IC 201. Positive voltage is generated at this pin for a moment when power supply is turned off, causing Q303 to turn ON.

As Q303 turns ON, the reset circuit momentarily operates to reset RLY 301 and RLY 302.

2. TEMPERATURE DETECTOR/POWER SAVE CIRCUIT

Heat sensing thyristor D605 detects the ambient temperatures of electrolytic condensers C401 and C402; when the temperature is 90±5°C, it turns ON to lower the gate voltage of FET Q601 and Q603 (in case of Lch), thus turning FET off. Accordingly, the input signal flows from R601, R101 to R603, and serves to lower the signal level by 3 dB.

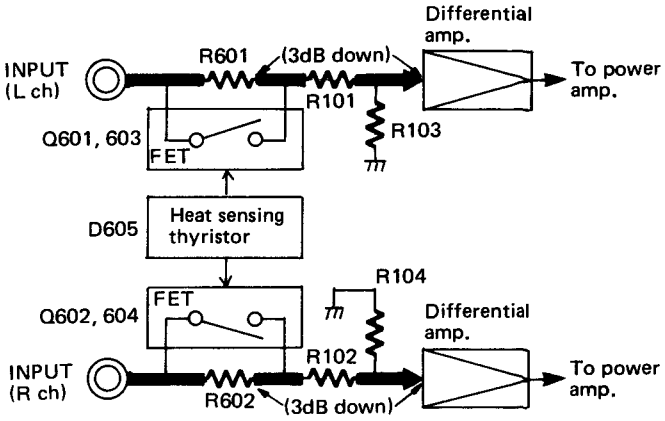


Fig. 6

3. BLOCK DIAGRAM OF BTL OPERATION (MONO)

① Connect the ⊕ side of speaker cord to the "⊕ side LEFT CHANNEL" main speaker terminal, and the ⊖ side of speaker cord to the "⊕ side RIGHT CHANNEL" main speaker terminal of the set, respectively.

② When a remote speaker terminal is used, connect the ⊕ side of speaker cord to "⊕ side LEFT CHANNEL" remote speaker terminal, and the ⊖ side of speaker cord to "⊕ side RIGHT CHANNEL" remote speaker terminal.

③ Shift the stereo/MONO (BTL) selector switch on the rear panel to "MONO (BTL)".

Cautions:

The ⊕ terminal of Rch is connected as ⊖ terminal during BTL. Since it is not grounded, the power amplifier circuit will break down if the line is shortcircuited.

④ Operation is virtually certain to be satisfactory when ordinary speakers are used for stereo reproduction because the output of 60W + 60W, 8Ω (20Hz ~ 20kHz) is quite sufficient to drive the speakers. In order, however, to obtain sufficient dynamic range to drive speakers of low efficiency, or for other professional use of this unit for witch an even greater output may be desired, the built-in BTL (Balanced-Transformerless) circuitry functions to permit the unit to operate as a high-output monaural power amplifier by effectively utilizing its two power amplifiers.

When the unit is used for Balanced-Transformerless Operation, the output becomes 120W, 8Ω (20Hz ~ 20kHz), with a total harmonic distortion rating of 0.007%.

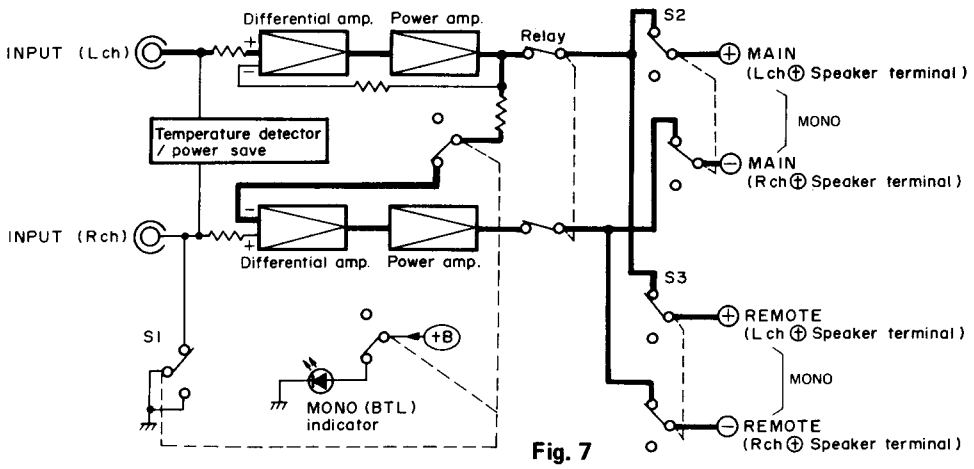


Fig. 7

■ DISASSEMBLY INSTRUCTIONS

- **How to remove the cabinet**
  1. Remove the 4 setscrews (❶ ~ ❹ in Fig. 8) of the cabinet.
- **How to remove the front panel**
  1. Remove the cabinet.
  2. Remove the 6 setscrews (❺ ~ ❿ in Fig. 8 and Fig. 9) of the front panel.
  3. Move the front panel in the direction of the arrow Ⓐ in Fig. 8.

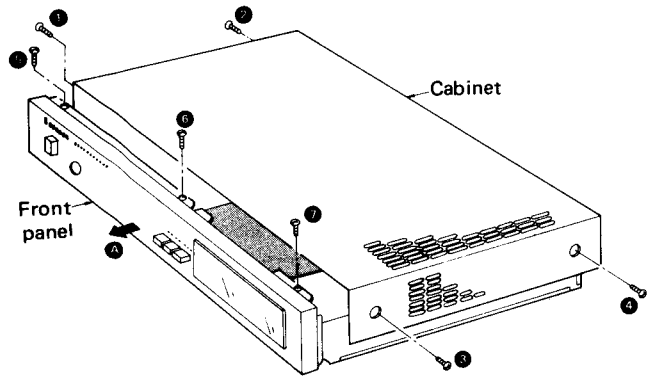


Fig. 8

- **How to remove the FL peak power meter printed circuit board**
  1. Remove the cabinet.
  2. Remove the front panel.
  3. As shown in Fig. 10, 11 lugs (⓳ ~ ㉒) to detach the display window plate ass'y from the front chassis.
  4. 4 lugs (㉓ ~ ㉖ in Fig. 10) to detach the printed circuit boards from the back of the display window plate ass'y.
  5. Remove the 2 setscrews (㉗ , ㉘ in Fig. 11) of the FL peak power meter printed circuit board.
  6. Remove the 2 lead connector (㉙ , ㉚ in Fig. 11) of the printed circuit board.
- **How to remove the speakers/meter range selector switch printed circuit board**
  1. Remove the cabinet.
  2. Remove the front panel.
  3. Remove the FL peak power meter printed circuit board.
  4. Remove the 3 setscrews (㉛ ~ ㉝ in Fig. 10 and Fig. 11) and cut of the 2 lead clampers.

- **How to remove the bottom board (Right side)**
  1. Remove the cabinet and front panel.
  2. Remove the 6 setscrews (⓫ , ⓭ and ⓯ ~ ⓲ in Fig. 9) of the bottom board.

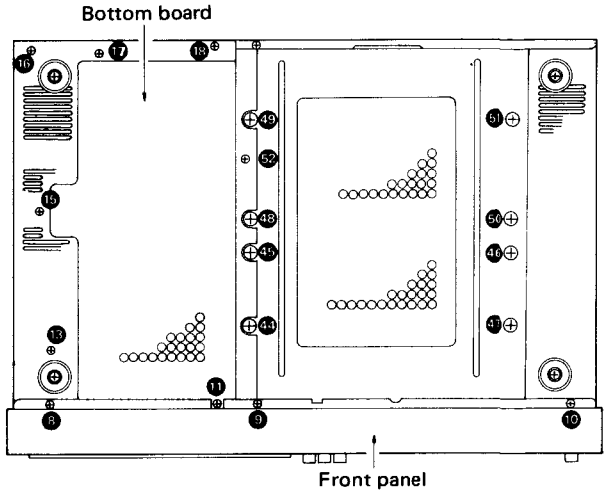


Fig. 9

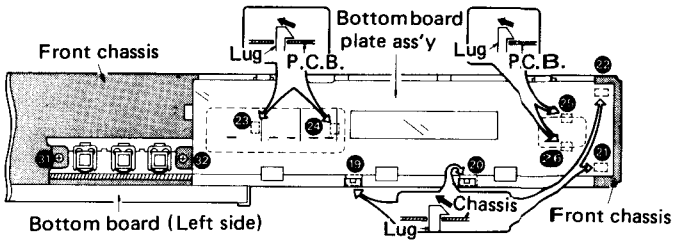


Fig. 10

- **How to remove the power transistor (Left channel)**
  1. Remove the cabinet.
  2. Remove the 4 setscrews (㉞ ~ ㊲ in Fig. 11) of the heat-sink.
  3. Remove the 2 setscrews (㊳ , ㊴ in Fig. 12) of the power transistor.
  4. Unsolder the power transistor.

Cautions:

When mounting the power transistor onto the heat-sink, especially keep the following points in mind.

1. Clean the area on the heat-sink side.
2. Be sure to use new insulating sheet (SMX497).
3. Never apply heat diffuser or the like to the insulating sheet (SMX497).
   (Otherwise, the insulation will be deteriorated leading to breakdown of power transistor.)

- **How to remove the power transistor (Right channel)**
  1. Remove the cabinet.
  2. Remove the bottom board.
  3. Remove the 4 setscrews (㊵ ~ ㊸ in Fig. 11) of the heat-sink.
  4. Remove the 2 setscrews (㊳ ~ ㊴ in Fig. 12) of the power transistor.
  5. Unsolder the power transistor (Fig. 13) and the metal fitting (Fig. 13) which secures the transistor (Q118).

Cautions:

When mounting the power transistor onto the heat-sink, especially keep the following points in mind.

1. Clean the area on the heat-sink side.
2. Be sure to use new insulating sheet (SMX497).
3. Never apply heat diffuser or the like to the insulating sheet (SMX497).
   (Otherwise, the insulation will be deteriorated leading to breakdown of power transistor.)

Cautions:

When soldering the metal fitting, completely set the transistor (Q118) onto the heat sink. See Fig. 13.

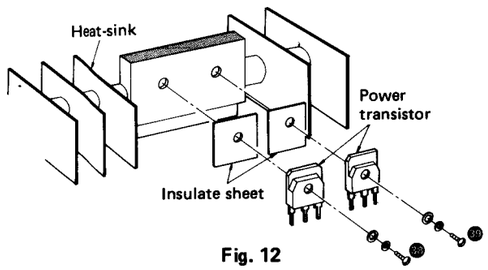


Fig. 12

- **How to remove the power transformer**
  1. Remove the cabinet.
  2. Remove the 4 setscrews (㉞ ~ ㊲ in Fig. 11) of the heat-sink.
  3. Remove the 4 setscrews (㊹ ~ ㊼ or ㊽ ~ ㊿ in Fig. 9) of the power transformer and cut of the 3 lead clampers.

Cautions:

When replacing the power transistor or power transformer, stop it with lead clamper so that each lead wire does not touch the heat-sink.

- **How to remove the main printed circuit board**
  1. Remove the cabinet.
  2. Remove the front panel.
  3. Remove the FL peak power meter printed circuit board.
  4. Remove the 1 setscrew (㊷ in Fig. 9) of the temperature detector printed circuit board bracket.
  5. Remove the 1 setscrew (⑮ in Fig. 9) of the Heat-sink bracket.
  6. Remove the 4 setscrews (㊵ ~ ㊸ in Fig.11) of the Heat-sink.
  7. Remove the 5 setscrews (㊸ ~ ㊼ in Fig.11) of the main printed circuit board.

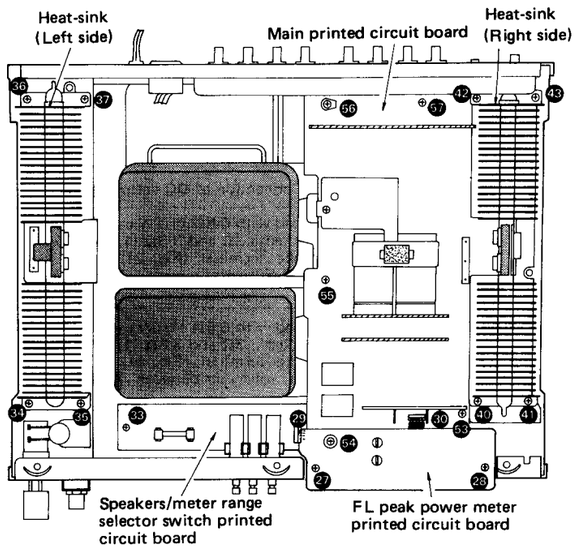


Fig. 11

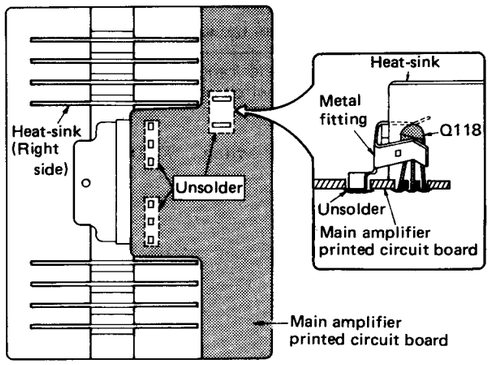


Fig. 13

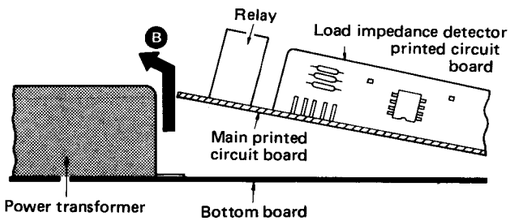


Fig. 14

8. Lift the main printed circuit board on the power transformer side in the direction of the arrow Ⓑ (Fig. 14) to remove it.
   In this case, it is often advisable to cut off the lead clamper beforehand.

Note:

After repair, stop the leads with a new lead clamper.

The heat sensing thyristor detects the ambient temperatures of the electrolytic condensers. Therefore, make sure after repair that the thyristor is positioned between electrolytic condensers C401 and C402.

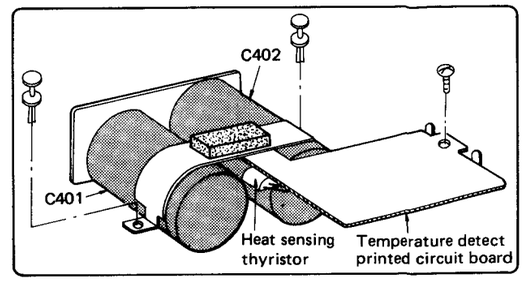


Fig. 15

- **Lead connector**
  1. To disconnect the lead wires from the lead connector, open the "lead holder" of the connector as shown in Fig. 16, and pull out the lead wires.
  2. The lead wires are provided with identification colors or patterns as in Fig. 16. So, insert them into the connector in correct positions.
  3. It is advisable to put pencil marks on both the leads and the connector beforehand for the convenience of insertion.

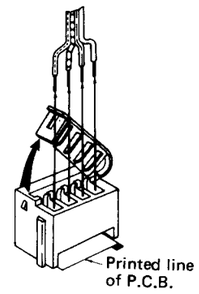


Fig. 16

Note: Setscrews ㊽ ~ ㊼ are screws with detents (Part No.: XTBS3+8BFZ1) as shown in Fig. 18 in order to make the contact of electric circuit perfect.
Take care not to mix up these screws with other screws.

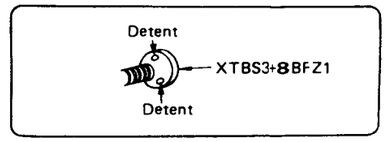


Fig. 18

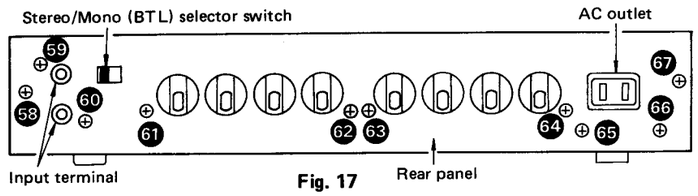


Fig. 17

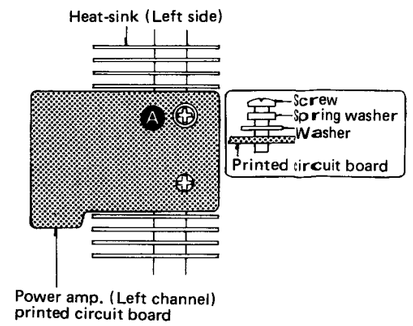


Fig. 19

Caution:

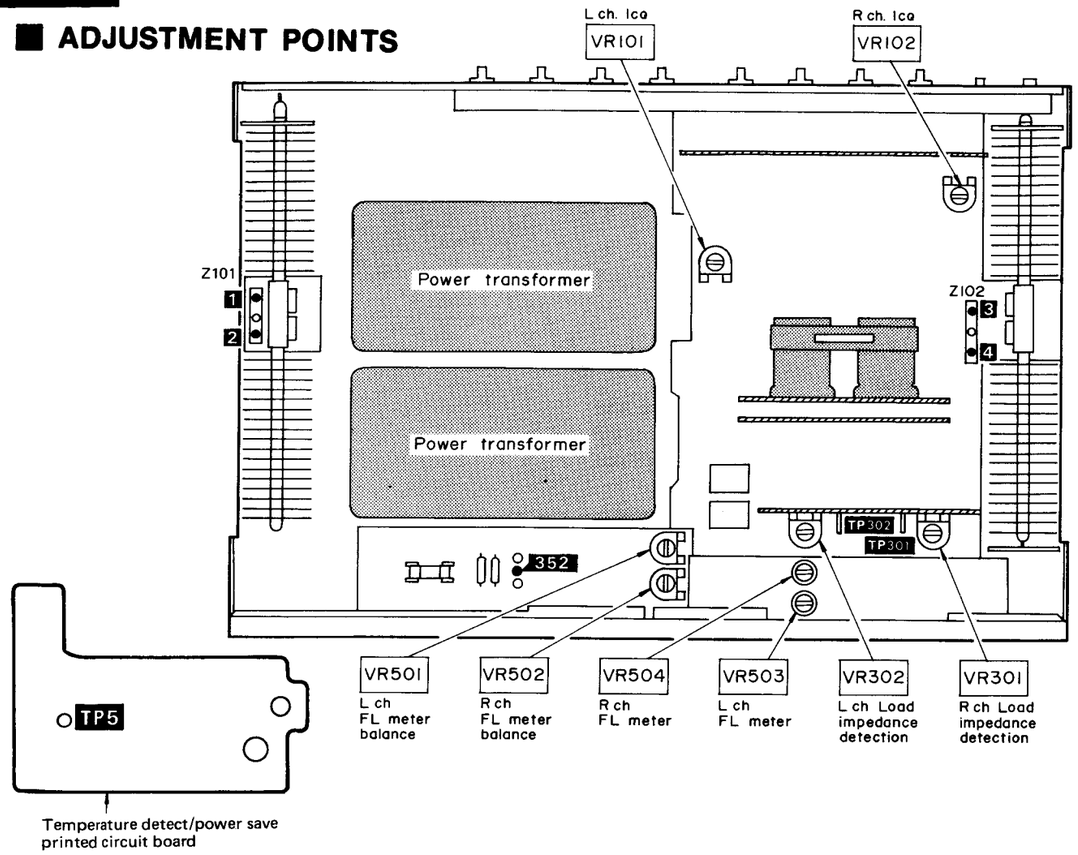
Do not remove the screw Ⓐ of the Fig. 19 during repair of the power amplifier because it is used for grounding. If it is removed, tighten it with spring washer and washer as shown in Fig. 19.

■ BEFORE REPAIR AND ADJUSTMENT

Turn off the power supply and short-circuit both ends of power supply condensers (C401, C402, 10,000μF) at resistance (about 10Ω, 5W) in order to discharge the charged voltage. Avoid short-circuit with a screwdriver or the like, otherwise the transistors or diodes may break down.
Before turning on the power supply after completion of repair, slowly apply the primary voltage by using a voltage regulator to make sure that the current consumed is free of abnormality. The current consumed at 60Hz/50Hz in no-signal mode is shown below with respect to supply voltage 110V/120V/220V/240V.

Power supply voltage		AC 110V	AC 120V	AC 220V	AC 240V
Current consumed	50/60 Hz	150 ~ 550mA	110 ~ 510mA	90 ~ 270mA	80 ~ 260mA

■ ADJUSTMENT POINTS



- **How to give induction hum.**

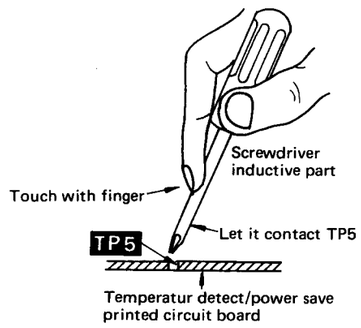


Fig. 20

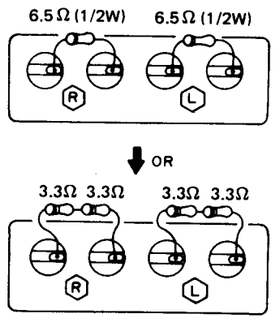
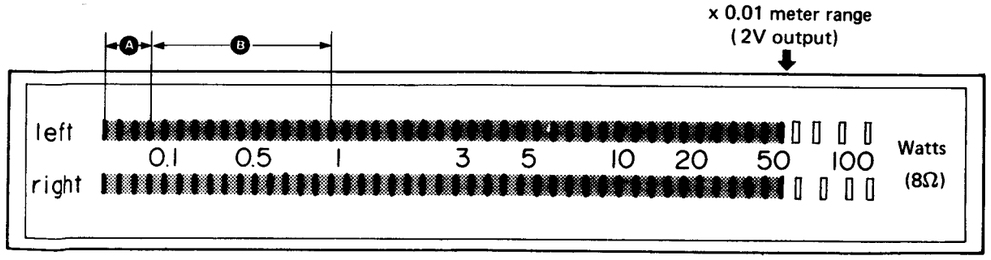


Fig. 21



FL peak power meter

Fig. 22

■ MEASUREMENTS AND ADJUSTMENTS——English

1. Load impedance detection and idling current of power transistor (ICQ)

- **Setting and instruments used**

1. Speaker selector . . . . . main
2. DC voltmeter
3. Instruments for circuit operation check
   (AC voltmeter, 1kHz oscillator, 8Ω load, 5W 0.33Ω resistor,
   1/2W 6.5Ω or 3.3Ω & 3.3Ω)

Item	Connection of DC voltmeter	VR adjusted	Adjustment
Adjustment of load impedance detection circuit	*Connect a load with 6.5Ω (1/2W carbon resistor) or series-connected 3.3Ω and 3.3Ω (1/2W, ±5%) to the "main" speaker terminal. (Fig. 21) *Connect a DC voltmeter between TP301 and chassis.	VR301	*Connect 352 and chassis. *Completely turn VR301 and VR302 anticlockwise beforehand. *Adjust VR301 so that the voltage of TP301 is –0.1V. *Adjust VR302 so that the voltage of TP302 is 0V in 100mV range.
	*Connect a load with 6.5Ω (1/2W carbon resistor) or series-connected 3.3Ω and 3.3Ω (1/2W, ±5%) to the "main" speaker terminal. (Fig. 21) *Connect a DC voltmeter between TP302 and chassis.	VR302	
Adjustment of ICQ	L channel Connect voltmenter to 1 (+) and 2 (–)	VR101	① Completely turn VR101 and VR102 anticlockwise beforehand ② Adjust VR101 (L channel) and VR102 (R channel) so that the voltage is 1.5mV, about 1 min. after power supply ON.
	R channel Connect voltmeter to 3 (–) and 4 (+)	VR102	

2. Fluorescent peak power meter

Setting

- Connect a low frequency oscillator to the input terminal (Lch and Rch) and AC electronic voltmeter to the speaker terminal.
- Add 1kHz signal from the low frequency oscillator to the set.

Item	Meter range select switch position	VR adjusted	Adjustment
FL Peak-power meter	Range switch ... X0.01	VR503 (L ch) VR504 (R ch)	1. Adjust the input level so that the AC voltmeter indicates 2 volts. 2. Adjust the semi-fixed variable resistors VR503 (L ch.) and VR504 (R ch.) so that the 50W segment of FL meter lights up dimly. (Fig. 22)
Balance	Range switch ... X0.01	VR501 (Lch) VR502 (Rch)	1. With the input gradually decreased, if Lch and Rch are unbalanced when the 1st segments (Fig. 22: Ⓐ) light up, then adjust the level by VR501 to lower the lighting level of Lch; VR502 to lower the lighting level of Rch. **Note:** • The 1st segments (Fig. 22: Ⓐ) to Lch and Rch should go out at the same time. • After the adjustment, the lighting range should be within Ⓑ (Fig. 22) with the range switch set to x1.

3. Check points

- **DC balance**
  ① Connect DC voltmeter and 8Ω load to speaker terminal.
  ② Make sure that output voltage is within ±30mV.

- **Overload detection circuit**
  ① Connect 8Ω load to "main" speaker terminal and 5W 0.33Ω resistance to "remote" speaker terminal.
  ② Apply 1kHz 30mV signal to "main" speaker terminal.
  ③ With speaker selector set at main and remote, make sure that relay in the set is OFF and no output is delivered.

  * **If protection relay turns OFF due to overload, the circuit and load will not restore their normal conditions unless power supply is once turned OFF and again turned ON.**

- **MONO (BTL) circuit**
  ① Connect the speaker cord to MONO (BTL).
  ② Shift the stereo/MONO (BTL) selector switch to MONO (BTL) Then make sure that the tap change relay turns on.
  ③ Connect DC voltmeter and 8Ω load to "main" speaker terminal.
  ④ Apply 1 kHz sine-wave 0.5V output to Lch INPUT terminal.

Stereo – MONO (BTL)	Output conditions	Voltage values
Stereo	8Ω Load Lch output	8.5 ~ 13.5V
MONO	8Ω Load BTL output	19 ~ 24V

*Lch and Rch of FL peak power meter should be at the same level.

- **Power saving circuit**
  ① Connect DC voltage and 8Ω load to "main" speaker terminal.
  ② Apply 1 kHz 0.5V output to both Lch and Rch INPUT terminals.
  ③ Give induction hum (Fig. 20) to TP5, and then check the output voltage.

Power saving circuit OFF	→	Power saving circuit ON
8.5 ~ 13.5V		6 ~ 9.5V

This circuit, once turned on, will not become reset. So, turn off power supply, and again turn it on over 20 seconds later.

■ MESSUNGEN UND JUSTIERUNGEN ——— Deutsch

1. Belastungsimpedanz-Detektor und ICQ

●Einstellungen und verwendete Instrumente
1. Lautsprecher-Wahlschalter . . . . . "main"
2. Gleichstrom-Voltmeter
3. Instrumente für die Schaltungsbetrieb-Prüfung (Wechselstrom-Voltmeter, 1kHz-Oszillator, 8Ω-Belastung, 5W 0,33Ω-Widerstand, 1/2W 6,5Ω oder 3,3Ω & 3,3Ω ± 5%)

Gegenstand	Anschluß des Voltmeters	Zu justierender Drehwiderstand	Justierung
Justierung der Belastungs-impedanz-Detektor-schaltung	*Eine Last mit 6,5Ω (1/2W Kohlewiderstand) oder in Serie geschalteten 3,3Ω und 3,3Ω (1/2W, ±5%) an den "main" Lautsprecheranschluß anschließen. (Abb. 21) *Ein Gleichstrom-Voltmeter zwischen TP301 und dem Chassis, anshließen.	VR301	* Anschluß 352 und das Chassis verbinden. *VR301 and VR302 vorher bis zum Anschlag entgegen dem Uhrzeigersinn drehen. *VR302 so justieren, daß die Spannung an TP301 –0,1V beträgt. *VR301 so justieren, daß die Spannung an TP302 0V beträgt.
	*Eine Last mit 6,5Ω (1/2W Kohlewiderstand) oder in Serie geschalteten 3,3Ω und 3,3Ω (1/2W, ±5%) an den "main" Lautsprecheranschluß anschließen. (Abb. 21) *Ein Gleichstrom-Voltmeter zwischen TP302 und dem Chassis, anshließen.	VR302	
Justierung von ICQ	Linker Kanal Voltmeter an 1 (+) und 2 (–) anschließen.	VR101	① VR101 und VR102 vorher bis zum Anschlag entgegen dem Uhrzeigersinn drehen. ② VR101 (linker Kanal) und VR102 (rechter Kanal) so justieren, daß die Spannung, ca. 10 Minuten nach dem Einschalten der Stromzufuhr, 20mV beträgt.
	Rechter Kanal Voltmeter an 3 (–) und 4 (+) anschließen.	VR102	

2. Spitzenwertanzeigen

Einstellung:
- Einen Niederfrequenzoszillator an die Eingangsklemme des Tuners schließen und parallel zu 8-ohm Belastungswiderstand den elektronischen Wechselstrom-Voltmeter an die Lautsprecherklemme schließen.
- 1 kHz Signal aus dem Niederfrequenzoszillator in das Gerät speisen.

Gegenstand	Stellung des Meterbereichswählers	Zu justierender widerstand	Justierung
FL Spitzenwert-anzeigen	Bereichswähler auf X0.01	VR503 (Linker Kanal) VR504 (Rechter K.)	1. Den Eingangspegel so justieren, daß der Wechselstrom-Voltmeter 2,0V anzeigt. 2. Die halbfest eingestellten Widerstände VR503 (linker Kanal) und VR504 (rechter Kanal) so einstellen, daß das 50W-Segment des Fluoreszenz-Aussteuerungsinstru-mentes schwach aufleuchtet. (Abb. 22)
Balance	Bereichswähler auf X0.01	VR501 (Linker Kanal) VR502 (Rechter K.)	1. Wenn beim allmählichen Verringern der Eingangsleistung das erste Segment des linken und des rechten Kanals (Abb. 22: Ⓐ) nicht gleichzeitig aufleuchten, ist der Pegel folgendermassen zu justieren: VR501 zum Senken des Aufleuchtpegels des linken Kanals; VR 502 zum Senken des Aufleuchtpegels des rechten Kanals. **Anmerkung:** ● Das erste Segment (Abb. 22: Ⓐ) des linken und rechten Kanals sollten gleichzeitig erlöschen. ● Nach der Justierung sollte der Aufleuchtbereich innerhalb von Ⓑ in Abb. 22 liegen, wenn der Bereichschalter auf "x1" eingestellt ist.

3. Prüfpunkte

- **Gleichstrom-Balance**
  ① Das Gleichstrom-Voltmeter und eine 8Ω-Last an den Lautsprecheranschluß anschließen.
  ② Überprüfen, daß die Ausgangsspannung innerhalb ±30mV liegt.

- **Überbelastungs-Detektorschaltung**
  ① Eine 8Ω-Last an den "main"-Lautsprecheranschluß und einen 5W, 0,33Ω-Widerstand an den "remote"-Lautsprecher-anschluß anschließen.
  ② Dem "main" -Lautsprecheranschluß ein Signal von 1kHz, 30mV zuleiten.
  ③ Den Lautstärkeregler ganz aufdrehen.
  ④ Mit auf "main and remote" eingestelltem Lautsprecher-Wahlschalter überprüfen, daß das Relais ausgeschaltet ist, und keine Ausgangsleistung ausgegeben wird.

  *** Nachdem das Schutzrelais aufgrund von Überbelastung ausgeschaltet wurde, muß der Netzschalter einmal aus- und wieder eingeschaltet werden, damit die Schaltung und die Last wieder in wieder in ihren normalen Zustand versetzt werden.**

- **MONO-Schaltung (BTL)**
  ① Das Lautsprecherkabel an MONO (BTL) anschließen.
  ② Den Stereo/MONO (BTL)-Wahlschalter auf MONO (BTL) stellen. Anschließend überprüfen, daß das Anzapfumschalt-Relais betätigt wird.
  ③ Das Gleichstrom-Voltmeter und 8Ω-Last an den "Main"-Lautsprecheranschluß anschließen.
  ④ 1 kHz-Sinuswellensignal von 0,5V Ausgangsleistung an den Eingangsanschluß des Linken Kanals anlegen.

Stereo / MONO (BTL)	Ausgangsbedingungen	Spannungswerte
Stereo	8Ω-Last, Ausgangsleistung linker Kanal	8,5 ~ 13,5 V
MONO	8Ω-Last, BTL-Ausgangsleistung	19 ~ 24 V

*Der FL-Pegelmesser sollte für den linken und rechten Kanal den gleichen Pegel anzeigen.

- **Stromsparschaltung**
  ① Gleichspannung und 8Ω-Last an den "Main"-Lautsprecheranschluß anschließen.
  ② Ausgangsleistung von 1 kHz, 0,5 V an den Eingangsanschluß des linken und des rechten Kanals anlegen.
  ③ Induktionsbrummen (Abb. 20) an TP5 anlegen und dann die Ausgangsspannung überprüfen.

Stromsparschaltung AUS	→	Stromsparschaltung EIN
8,5 ~ 13,5 V		6 ~ 9,5 V

Einmal eingeschaltet, kann diese Schaltung nicht zurückgestellt werden. Daher die Stromversorgung ausschalten und nach mehr als 20 Sekunden wieder einschalten.

■ MESURAGES ET RÉGLAGES — Français

1. Détection d'impédance de charge et ICQ

●Réglages et appareils utilisés

1. Sélecteur de haut-parleurs . . . . . principal (main)
2. Voltmètre à C.C.
3. Appareils pour la vérification du fonctionnement du circuit. (Voltmètre à C.A., oscillateur de 1kHz, charge de 8Ω, résistance de 5W 0,33Ω, 1/2W 6,5Ω ou 3,3Ω et 3,3Ω ±5%)

Article	Branchement du voltmètre à C.C.	VR à régler	Réglage
Réglage du circuit de détection d'impédance de charge.	*Mettre en circuit une charge avec 6,5Ω (résistance à couche de carbone de 1/2W) ou un montage en série de 3,3Ω et 3,3Ω (1/2W, ±5%) à la prise du haut-parleur "principal". (Fig. 21) *Brancher un voltmètre à C.C. entre TP301 et le châssis.	VR301	*Reccorder la borne 352 et le châssis. *Tourner préalablement complètement dans le sens inverse des aiguilles d'une montre VR301 et VR302. *Régler VR302 de façon à ce que la tension de TP301 soit de −0.1V. *Régler VR301 de façon à ce que la tension de TP302 soit de 0V.
	*Mettre en circuit une charge avec 6,5Ω (résistance à couche de carbone de 1/2W) ou un montage en série de 3,3Ω et 3,3Ω (1/2W, ±5%) à la prise du haut-parleur "principal". (Fig. 21) *Brancher un voltmètre à C.C. entre TP302 et le châssis.	VR302	
Réglage de ICQ	Canal de gauche Brancher le voltmètre à 1 (+) et 2 (−).	VR101	①Tourner préalablement complètrement dans le sens inverse des aiguilles d'une montre VR101 et VR102. ②Régler VR101 (canal de gauche) et VR102 (canal de droite) de façon à ce que la tension soit de 20mV, environ 10 minutes après la mise en marche de la tension d'alimentation.
	Canal de droite Brancher le voltmètre à 3 (−) et à 4 (+).	VR102	

2. Indicateurs de puissance de crête fluorescents

Réglage:

- Brancher un oscillateur à basse fréquence à la borne de sortie du tuner et une résistance de charge de 8 ohms et un voltmétre électronique à la borne de l'enceinte.
- Par l'oscillateur à basse fréquence, appliquer un signal de 1 kHz à l'appareil.

Article	Position du commutateur de sélection de la gamme du compteur	VR à régler	Réglage
FL Indicateurs de puissance de crête fluorescents	Commutateur de gamme X0,01	VR503 (CG) VR504 (CD)	1. Régler le niveau de sortie de telle sorte que la voltmétre CA indique 2,0V. 2. Régler les résistances variables semi-fixes VR503 (canal de gauche) et VR504 (canal de droite), de façon à ce que le segment de 50W de l'appareil de mesure FL s'éclaire faiblement. (Fig. 22)
Equilibre	Commutateur de gamme X0,01	VR501 (CG) VR502 (CD)	1. Avec l'entrée graduellement diminuée, si la gauche et la droite sont en dissymétrie lorsque les premiers segments (Fig. 22: Ⓐ) s'éclairent, ajuster alors le niveau de la manière suivante: VR501 Diminuer le niveau d'éclairement de gauche VR502 Diminuer le niveau d'éclairement de droite **Nota:** ● Les premiers segments (Fig. 22: Ⓐ) de gauche et de droite devront s'éteindre au même moment. ● Après la mise au point, la plage d'éclairement devra être en deçà de Ⓑ (Fig. 22) avec le commutateur de plage placé sur x1.

3. Points de vérification

- **Compensation du C.C.**
  ① Brancher le voltmètre à C.C. et une charge de 8Ω à la prise de haut-parleurs.
  ② S'assurer que la tension de sortie est en deçà de ±30mV.
- **Circuit de détection d'une surcharge**
  ① Connecter une charge de 8Ω à la prise de haut-parleurs "principale" ("main") et une résistance de 5W 0,33Ω à la prise de haut-parleurs "auxiliaire" ("remote").
  ② Appliquer un signal de 1kHz 30mV à la borne du haut-parleur " principal" ("main").
  ③ Augmenter le volume sonore au maximum.
  ④ Avec le sélecteur de haut-parleurs réglé sur "main" (principal) et sur "remote" (auxiliaire), s'assurer que le relais dans l'appareil soit mis hors circuit et qu'aucune sortie ne soit livrée.

*** Si le relais de protection est mis hors circuit à cause d'une surcharge, le circuit et la charge ne récupéreront pas leurs conditions normales à moins que l'alimentation secteur soit une fois mise hors circuit et remise à nouveau en marche.**

- **Circuit monophonique BTL (Montage sans trransformateur)**
  ① Raccorder le câble du haut-parleur au circuit monophonique (BTL).
  ② Glisser le commutateur-sélecteur stéréo/mono (BTL) sur "mono" (BTL). Puis, s'assurer que le relais à changement de raccordement est mis en marche.
  ③ Brancher un voltmètre C.C. et une charge de 8Ω sur la borne du haut-parleur principal ("main").
  ④ Appliquer une puissance de sortie de 0,5V sinusoidale de 1 kHz à la borne d'ENTREE de gauche.

Stéréo / MONO (BTL)	Conditions de sortie	Valeurs de tension
Stéréophonique	Charge de 8Ω Sortie de gauche	8.5 ~ 13.5 V
Monophonique	Charge de 8Ω Sortie BTL	19 ~ 24 V

*La gauche et la droite du compteur à puissance de crête fluorescent devront être du même niveau.

- **Circuit économisant de l'énergie**
  ① Brancher une tension de C.C. et une charge de 8Ω à la borne du haut-parleur principal ("main").
  ② Appliquer une sortie de 0,5V 1 kHz à la fois aux bornes d'ENTREE de gauche et de droite.
  ③ Procurer un ronflement d'induction (Fig. 20) à TP5 , puis vérifier la tension de sortie.

ARRET du circuit économisant de l'énergie	➡	MARCHE du circuit économisant de l'énergie
8.5 ~ 13.5 V		6 ~ 9.5 V

Ce circuit, une fois mis en marche, ne se remettra pas en position initiale. Aussi, couper l'alimentation et remettre à nouveau en marche après 20 secondes.

■ MEDICIONES Y AJUSTES — Español

1. Detección de impedancia de carga y corriente de reposo de transistor de potencis (ICQ)

●Puesta e instrumentos usados

1. Selector de altavoz . . . . . principal
2. Voltímetro de CC
3. Instrumentos para verificaicón de operación de circuito (Voltímetro de CA, oscilador 1kHz, carga 8Ω, resistor 5W 0,33Ω, 1/2W 6,5Ω ó 3,3Ω y 3,3Ω)

Item	Conexión de voltimetro de CC	RV ajustado	Procedimiento de ajuste
Ajuste del circuito de detección de impedancia de carga	*Conectar una carga con 6,5Ω (resistor de carbón de 1/2W) ó 3,3Ω y 3,3Ω (1/2W, ±5%), conectados en serie, al terminal del altavoz "principal". (Fig. 21) *Conectar un voltímetro de CC entre TP301 y chasis.	VR301	*Conectar terminal 352 y chasis. *Girar completamente VR302 y VR302 a la izquierda de antemano. *Ajustar VR302 de manera que el voltaje de TP301 −0,1V. *Ajustar VR301 de manera que el voltaje de TP302 sea 0V.
	*Conectar una carga con 6,5Ω (resistor de carbón de 1/2W) ó 3,3Ω y 3,3Ω (1/2W, ±5%), conectados en serie, al terminal del altavoz "principal". (Fig. 21) *Conectar un voltímetro de CC entre TP302 y chasis.	VR302	
Ajuste de ICQ	Canal I Conectar voltímetro a 1 (+) y 2 (−)	VR101	① Girar completamente VR101 y VR102 a la izquierda de antemano ② Ajustar VR101 (canal I) y VR102 (canal D) de manera que el voltaje sea 20mV, unos 10 min. después de conectar el suministro de energía.
	Canal D Conectar voltímetro a 3 (−) y 4 (+)	VR102	

2. Medidor fluorescente de potencia de cresta

Puesta

- Conectar un oscilador de baja frecuencia al terminal de entrada de sintonizador, y el resistor de carga 8-ohmios y voltímetro electrónico de CA al terminal del altavoz.
- Añadir señal 1kHz del oscilador de baja frecuencia al aparato.

Item	Posición de interruptor selector de gama de medidor	RV ajustado	Procedimiento de ajuste
FL Indicadores de potencia-cresta	Interruptor de gama ... X0.01	VR503 (Canal I) VR504 (Canal D)	1. Ajustar el nivel de entrada de manera que el voltímetro de CA indique 2 voltios. 2. Ajustar los resistores variables semifijos VR503 (C.I.) y VR504 (C.D.) de manera que el segmento de 50W del medidor FI se ilumine débilmente (Fig. 22)
Equilibrio	Interruptor de gama ... X0.01	VR501 (Canal I) VR502 (Canal D)	1. Si, al ir disminuyendo poco a poco la entrada, el canal de izquierda (Lch) y el de derecha (Rch) quedaran desequilibrados cuando se iluminan los primeros segmentos (Fig. 22: Ⓐ), entonces regular el nivel usando VR501 para hacer disminuir el nivel de iluminación del canal izquierdo. VR502 para hacer disminuir el nivel de iluminación del canal derecho. **Notas:** • Los primeros segmentos (Fig. 22: Ⓐ) del canal de izquierda (Lch) y del de derecha (Rch) deberán producirse al mismo tiempo. • Una vez hecho el reglaje, el alcance de iluminación beberá mantener dentro del ámbito Ⓑ (Fig. 22) con el interruptor de alcance puesto en x1.

3. Puntos de verificación

- **Equilibrio de CC**
  ① Conectar el voltímetro de CC y carga de 8Ω al terminal del altavoz.
  ② Asegurarse de que el voltaje de salida esté dentro de ±30mV.

- **Circuito de detección de sobrecarga**
  ① Conectar la carga de 8Ω al terminal del altavoz "principal" (main) y la resistencia de 5W 0,33Ω al terminal del altavoz "remoto" (remote).
  ② Aplicar señal de 1kHz 30mV a terminal de altavoz "principal"
  ③ Hacer el volumen de sonido máximo.
  ④ Con el selector del altavoz puesto en principal y remoto, asegurarse de que el relé del aparato esté en OFF (desconectado) y no se transmita potencia de salida.

  *** Si el relé de protección se desconecta debido a sobrecarga, el circuito y la carga no se repondrán a sus condiciones normales, a no ser que el suministro de energía se desconecte una vez y se conecte de nuevo.**

- **Circuito MONO (BTL)**
  ① Conectar el cable del altavoz a MONO (BTL).
  ② Correr el selector de estéreo/MONO (BTL) a la posición marcada MONO (BTL). A continuación, cerciorarse de que se encienda el relé de cambio de toma.
  ③ Conectar el voltímetro de C.C. y la carga de 8Ω al terminal de los altavoces marcado "main".
  ④ Aplicar una potencia de salida de 0,5V de una onda sinusoidal de 1 kHz al terminal marcado INPUT del canal de izquierda (Lch).

Estéreo – MONO (BTL)	Condiciones de salida	Valores de tensión
Estéreo	Salida del canal Lch con carga de 8Ω	8,5 ~ 13,5 V
MONO	Salida BTL con carga de 8Ω	19 ~ 24 V

*El canal Lch y el Rch del medidor de potencia de cresta fluorescente (FL) deberán encontrarse al mismo nivel.

- **Circuito ahorrador de corriente**
  ① Conectar la tensión de C.C. y la carga de 8Ω al terminal de los altavoces marcado "main".
  ② Aplicar una salida de 0,5V de 1 kHz a los terminales marcados INPUT tanto del canal de izquierda (Lch) como del de derecha (Rch).
  ③ Suministrar un zumbido de inducción (Fig. 20) a TP5, y, a continuación, comprobar la tensión de salida.

Circuito ahorrador de corriente en OFF	➡	Circuito ahorrador de corriente en ON
8,5 ~ 13,5 V		6 ~ 9,5 V

Este circuito, una vez encendido, no se apagará. Por lo tanto, apagar una vez la corriente y volver a encenderla transcurridos unos 20 segundos.

■ REPLACEMENT PARTS LIST ····· Electrical Parts

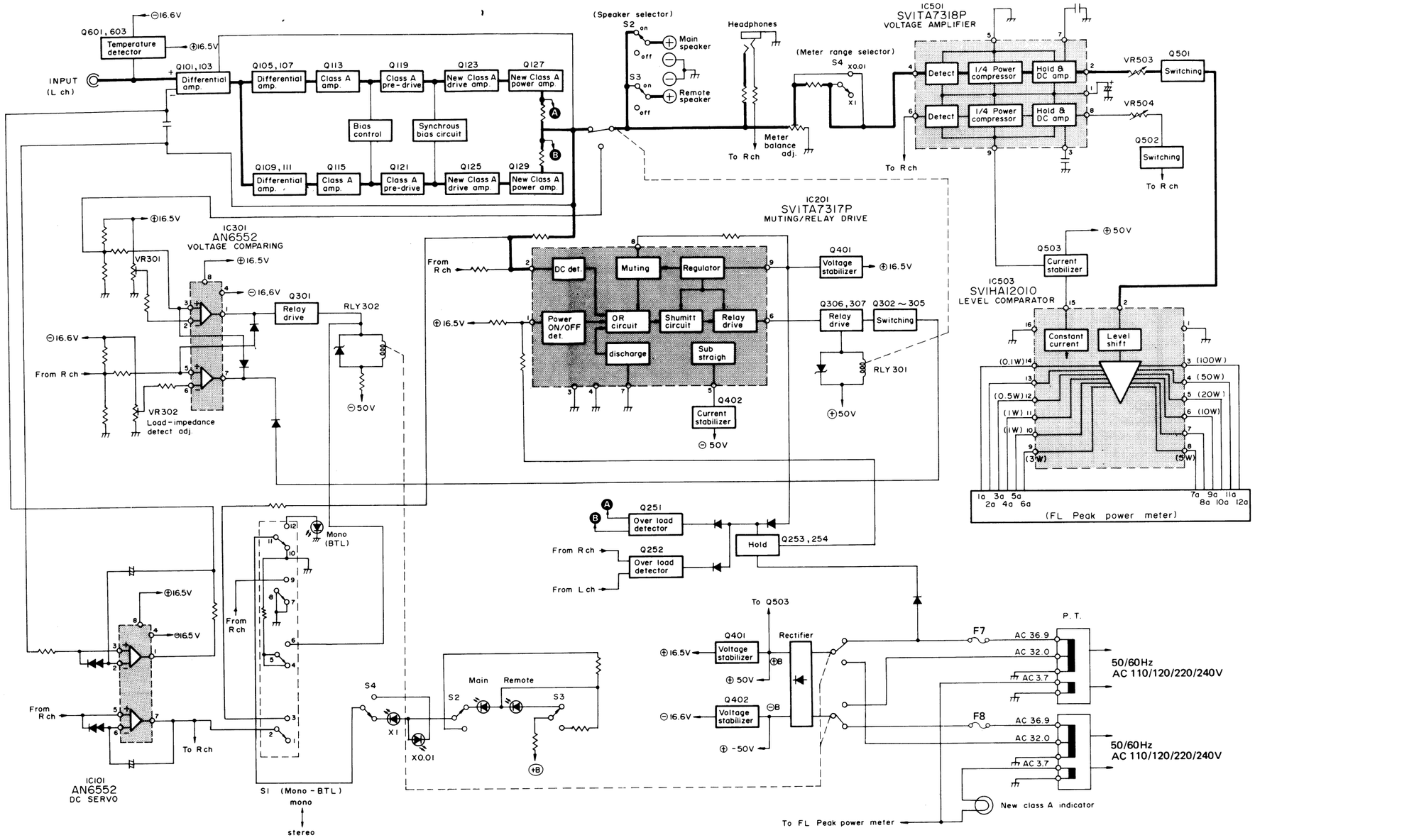
Notes: 1. Part numbers are indicated on most mechanical parts.
Please use this part number for parts orders.
2. Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

Ref. No.		Part No.	Part Name & Description
INTEGRATED CIRCUITS			
IC101		AN6552F	IC, DC Servo
IC201		SVITA7317P	IC, Muting/Relay Drive
IC301		AN6552F	IC, Voltage Comparing
IC501		SVITA7318P	IC, Voltage Amplifier
IC502, 503		SVIHA12010	IC, Level Comparator
TRANSISTORS			
Q101~104		2SK170–GR	Transistor, Differential Amplifier (Use in ranks BG, BL or GR)
Q105~108		2SC1980–T	Transistor, Differential Amplifier (Use in ranks Q, R or S)
Q109~112		2SA921–T	Transistor, Differential Amplifier (Use in ranks Q, R or S)
Q113, 114		2SA1123–R	Transistor, Pre-Driver
Q115, 116		2SC2631–R	Transistor, Pre-Drirer (Use in pair ranks Q113, 114, Q115 & 116)
Q117, 118		2SC1815–Y	Transistor, ICQ & Synchrorize Bias (Use in ranks Y or O)
Q119, 120		2SC2632–R	Transistor, Pre-Driver (Use in ranks Q, R, or S)
Q121, 122		2SA1124–R	Transistor, Pre-Driver (Use in ranks Q, R, or S) (Use in pair ranks Q119, 120, Q121 & 122)
Q123, 124		2SC2592–R	Transistor, New Class A Drive Amplifier (Use in ranks Q, R or S)
Q125, 126		2SA1112–R	Transistor, New Class A Drive Amplifier (Use in ranks Q, R or S)) (Use in pair ranks Q123, 124, Q125 & 126)
Q127, 128		2SC2581S–Y	Transistor, New Class A Power Amplifier
Q129, 130		2SA1106S–Y	Transistor, New Class A Power Amplifier (Use in pair ranks Q127, 128, Q129 & 130)
Q251, 252		2SC1980–T	Transistor, Over Load Detector (Use in ranks Q, R or S)
Q253		2SC1815–Y	Transistor, Hold (Use in ranks Y or O)
Q254		2SA1015–Y	Transistor, Hold (Use in ranks Y or O)
Q301		**2SA777–R**	Transistor, Relay Driver I (Use in ranks Q, R or S)
Q302,304,305		2SA1015–Y	Transistor, Switching (Use in ranks Y or O)
Q303,501,502		2SA1815–Y	Transistor, Switching (Use in ranks Y or O)
Q306		2SC1815–Y	Transistor, Relay-Driver (Use in ranks Y or O)
Q307		**2SC1509FR**	Transistor, Relay-Driver (Use in ranks Q, R or S)
Q401		**2SD836–Q**	Transistor, Current Stabilizer (Use in ranks Q, R or S)
Q402		2SB750–Q	Transistor, Current Stabilizer
Q503		2SD762–O	Transistor, Current Stabilizer (Use in ranks O, P or Q)
Q601~604		2SK301–S	Transistor
DIODES			
D101~104		**MA162A**	Diode, Switching
D105~108, 125, 126		**MA27A1**	Diode
D109~112		**MA162A**	Diode, Switching
D113~120		**2–0A99**	Diode, Synchro Bias
D121~124 131, 132		**MA27A2**	Diode
D201, 202, 251 252, 301, 302 305, 502		**MA162A**	Diode, Bias Supply, Protection Circuit
D303, 306, 308 309		**MA162A**	Diode
D304, 307		SVDMZ422B	Diode, 22V, Zener
D401~404	⚠	**SVDS3V40**	Diode, Rectifier
D405, 406		SVDMZ318	Diode, 18V, Zener
D407	⚠	SVDSR1K2	Diode, Rectifier
D411~415		LN217RP	Diode, Function Indicator
D501		SVDMZ320	Diode, 20V, Zener
D601, 602		**MA162A**	Diode
D603, 604		SVDMZ304	Diode, 4V, Zener
D605		SVTTT201–90	Diode, Thyristor
D606		**RVDEQA0106S**	Diode, 6V, Zener
COILS and TRANSFORMERS			
L101, 102		SLQY15G–30	Coil, Choke
T401, 402	⚠	SLT5Z3	Transformer, Power Source

Ref. No.		Part No.	Part Name & Description
SWITCHES			
S1		RSS42A	Switch, Mono BTL Select
S2, 3, 4		SSH3025–2	Switch, Speaker, Meter Range Select
S5	⚠	ESB90259S	Switch, Power Source
S6	⚠	ESE37200	Switch, Volt Adjuster
FLUORESCENT DISPLAY TUBE			
FL		SADBG89Z	FL, Peak Power Meter
RELAYS			
RLY301	⚠	SSY99–1	Relay, Speaker Protection
RLY302	⚠	SSY101–1	Relay, Transformer Top Select of Secondary
VARIABLE RESISTORS			
VR101, 102		**EVNM4AA00B52**	ICQ Adjustment, 500Ω (B)
VR301, 302		**EVNM0AA00B14**	Load Impedance, Detect Adjustment, 10kΩ (B)
VR501, 502		**EVNM4AA00B53**	FL Meter Balance Adjustment, 5kΩ (B)
VR503, 504		**EVNM4AA00B23**	FL Meter Level Adjustment, 2kΩ (B)
THERMISTERS			
TH101, 102		ERTD2ZHL332S	Thermister, Themal Compensation, 3.3kΩ
TH103, 104 251, 252		ERTD2ZHL103S	Thermister, Themal Compensation, 10kΩ
LAMP			
PL1	⚠	XAMR81S10	Lamp, New Class A, 150mA (8V)
FUSE			
F1, 2, 3, 4, 5, 6	⚠	XBA2C10TRO	Fuse, 1A (250V)
F7, 8	⚠	XBA2C63TRO	Fuse, 6.3A (250V)
COMPONENT COMBINATIONS			
Z101, 102	⚠	ERF3GBKR22N	Component Combination, 3W, 0.22Ω (x2)
Z103, 104, 105		ECQJ0517	Component Combination, 0.047μF, 10Ω
Z401		SXRFS203ZSM	Component Combination, 0.01μF (x2)
RESISTORS			
R101, 102		**ERD25FJ102**	Carbon, 1/4W, 1kΩ, ±5%
R103, 104		**ERD25TJ473**	Carbon, 1/4W, 47kΩ, ±5%
R105, 106		**ERD25TJ123**	Carbon, 1/4W, 12kΩ, ±5%
R107, 108		**ERD25TJ123**	Carbon, 1/4W, 12kΩ, ±5%
R109, 110	⚠	**ERD25FJ471**	Carbon, 1/4W, 470Ω, ±5%
R111, 112		**ERD25TJ153**	Carbon, 1/4W, 15kΩ, ±5%
R113, 114		**ERD25TJ223**	Carbon, 1/4W, 22kΩ, ±5%
R115, 116		**ERD25TJ683**	Carbon, 1/4W, 68kΩ, ±5%
R117, 118	⚠	**ERD25FJ122**	Carbon, 1/4W, 1.2kΩ, ±5%
R119, 120	⚠	**ERD25FJ122**	Carbon, 1/4W, 1.2kΩ, ±5%
R121, 122		**ERD25TJ153**	Carbon, 1/4W, 15kΩ, ±5%
R123, 124	⚠	**ERD25FJ122**	Carbon, 1/4W, 1.2kΩ, ±5%
R125, 126	⚠	**ERD25FJ122**	Carbon, 1/4W, 1.2kΩ, ±5%
R127, 128		**ERD25FJ332**	Carbon, 1/4W, 3.3kΩ, ±5%
R129, 130		**ERD25FJ103**	Carbon, 1/4W, 10kΩ, ±5%
R131, 132		**ERD25FJ103**	Carbon, 1/4W, 10kΩ, ±5%
R133, 134	⚠	**ERD25FJ122**	Carbon, 1/4W, 1.2kΩ, ±5%
R135, 136	⚠	**ERD25FJ102**	Carbon, 1/4W, 1kΩ, ±5%
R137, 138	⚠	ERD2FCG101	Carbon, 2W 100Ω, ±2%
R139, 140	⚠	ERD2FCG101	Carbon, 2W, 100Ω, ±2%
R141, 142		**ERD25FJ821**	Carbon, 1/4W, 820Ω, ±5%
R143, 144		**ERD25FJ103**	Carbon, 1/4W, 10kΩ, ±5%
R145, 146		**ERD25FJ682**	Carbon, 1/4W, 6.8kΩ, ±5%
R147, 148		**ERD25TJ333**	Carbon, 1/4W, 33kΩ, ±5%
R149, 150		**ERD25FJ102**	Carbon, 1/4W, 1kΩ, ±5%
R151, 152	⚠	**ERD25FJ102**	Carbon, 1/4W, 1kΩ, ±5%
R153, 154		**ERD25FJ103**	Carbon, 1/4W, 10kΩ, ±5%
R155, 156		**ERD25TJ184**	Carbon, 1/4W, 180kΩ, ±5%
R157, 158		**ERD25TJ184**	Carbon, 1/4W, 180kΩ, ±5%
R159, 160	⚠	ERD2FCG390	Carbon, 2W, 39Ω, ±2%
R161, 162	⚠	ERD2FCG390	Carbon, 2W, 39Ω, ±2%
R163, 164	⚠	**ERD25FJ221**	Carbon, 1/4W, 220Ω, ±5%
R165, 166	⚠	**ERG1ANJ100**	Metal Oxide, 1W, 10Ω, ±5%
R167, 168		**ERD25TJ223**	Carbon, 1/4W, 22kΩ, ±5%
R169, 170		**ERD25FJ122**	Carbon, 1/4W, 1.2kΩ, ±5%
R171, 172		**ERD25TJ104**	Carbon, 1/4W, 100kΩ, ±5%
R173, 174		**ERD25TJ104**	Carbon, 1/4W, 100kΩ, ±5%
R175, 176		**ERD25FJ103**	Carbon, 1/4W, 10kΩ, ±5%

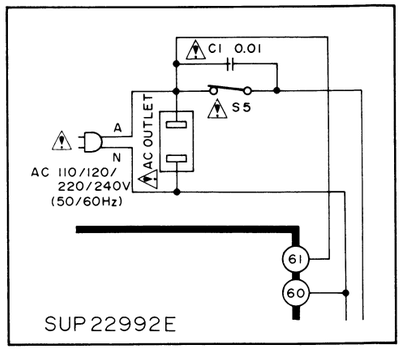
Continued on page 28

■ BLOCK DIAGRAM

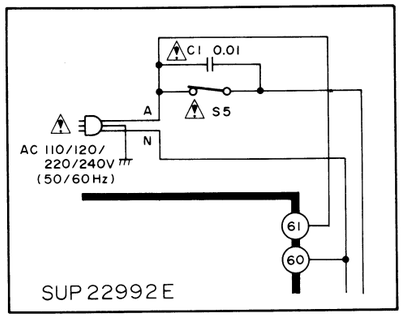


- **Power source circuit for [XA], [XL] and [EG] area only.**

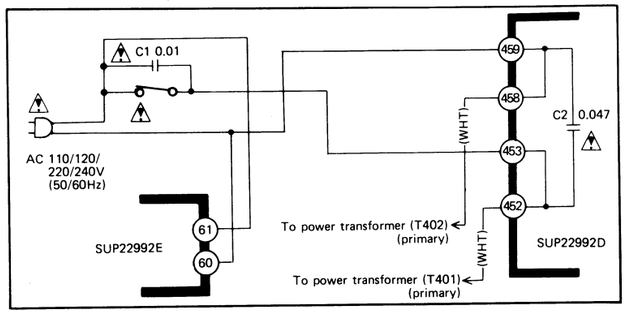
[XA] area
For Southeast Asia, Africa, Middle Near East and Central South America.



[XL] area
For Australia.

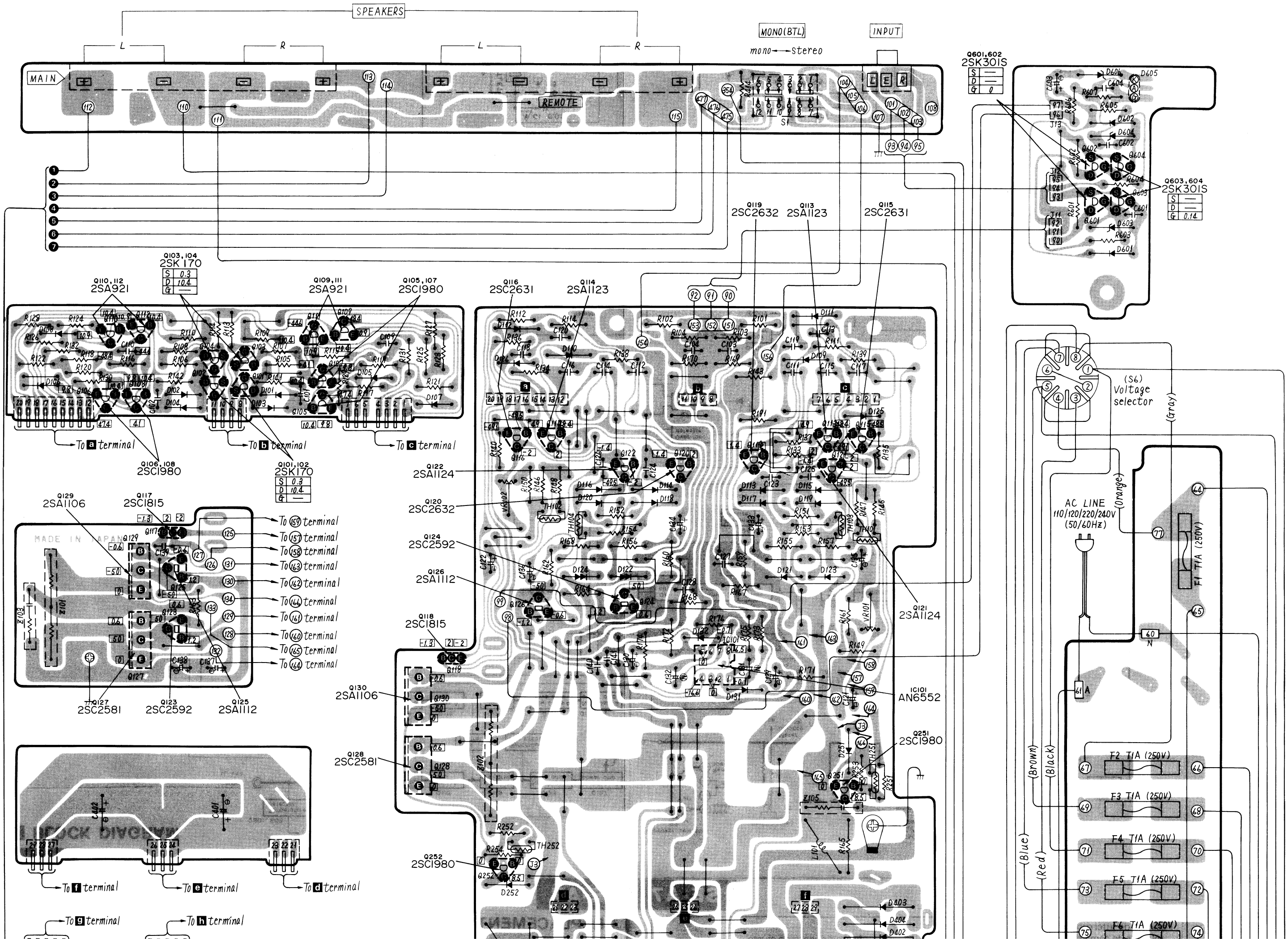


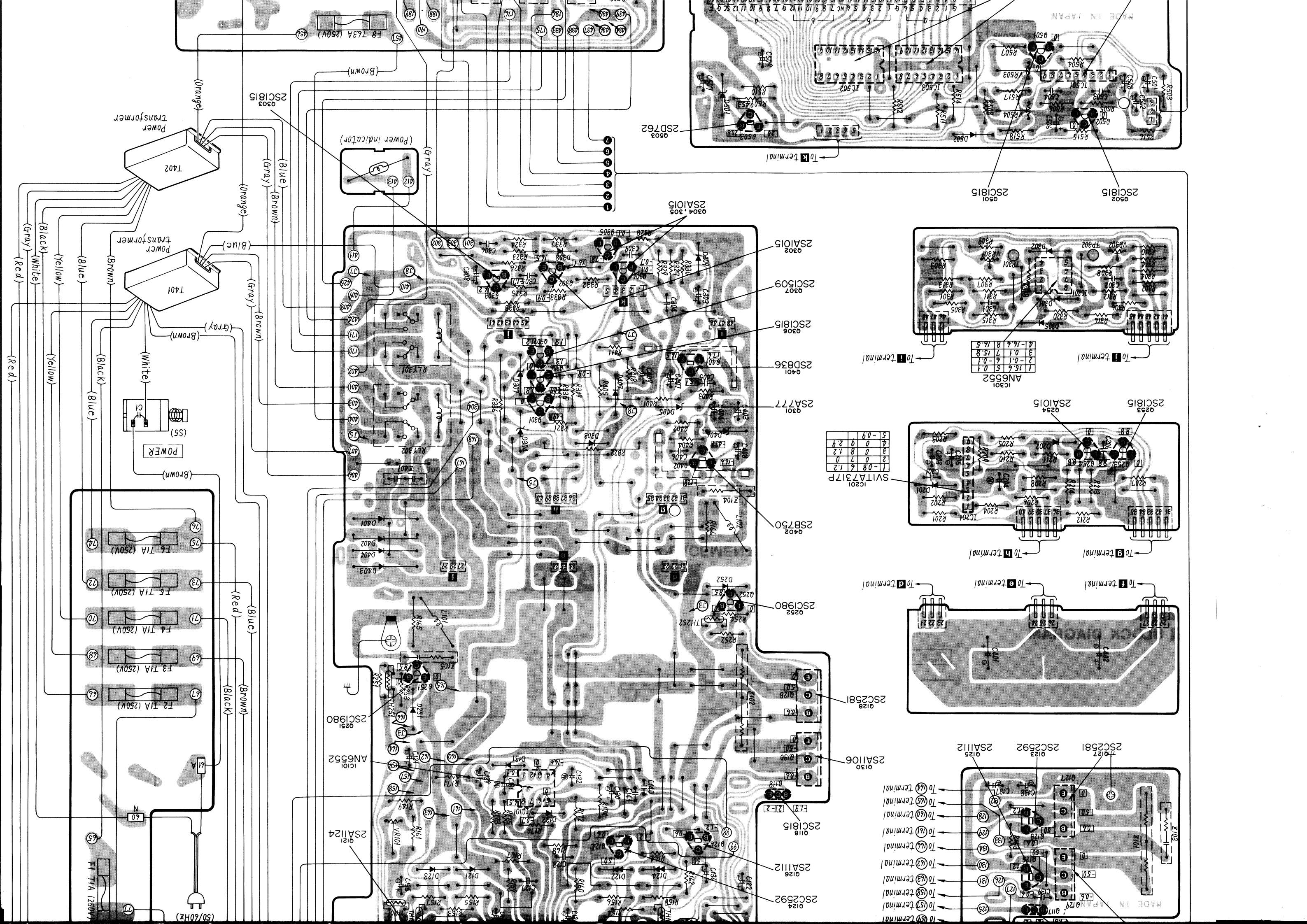
[EG] area
For F.R. Germany.

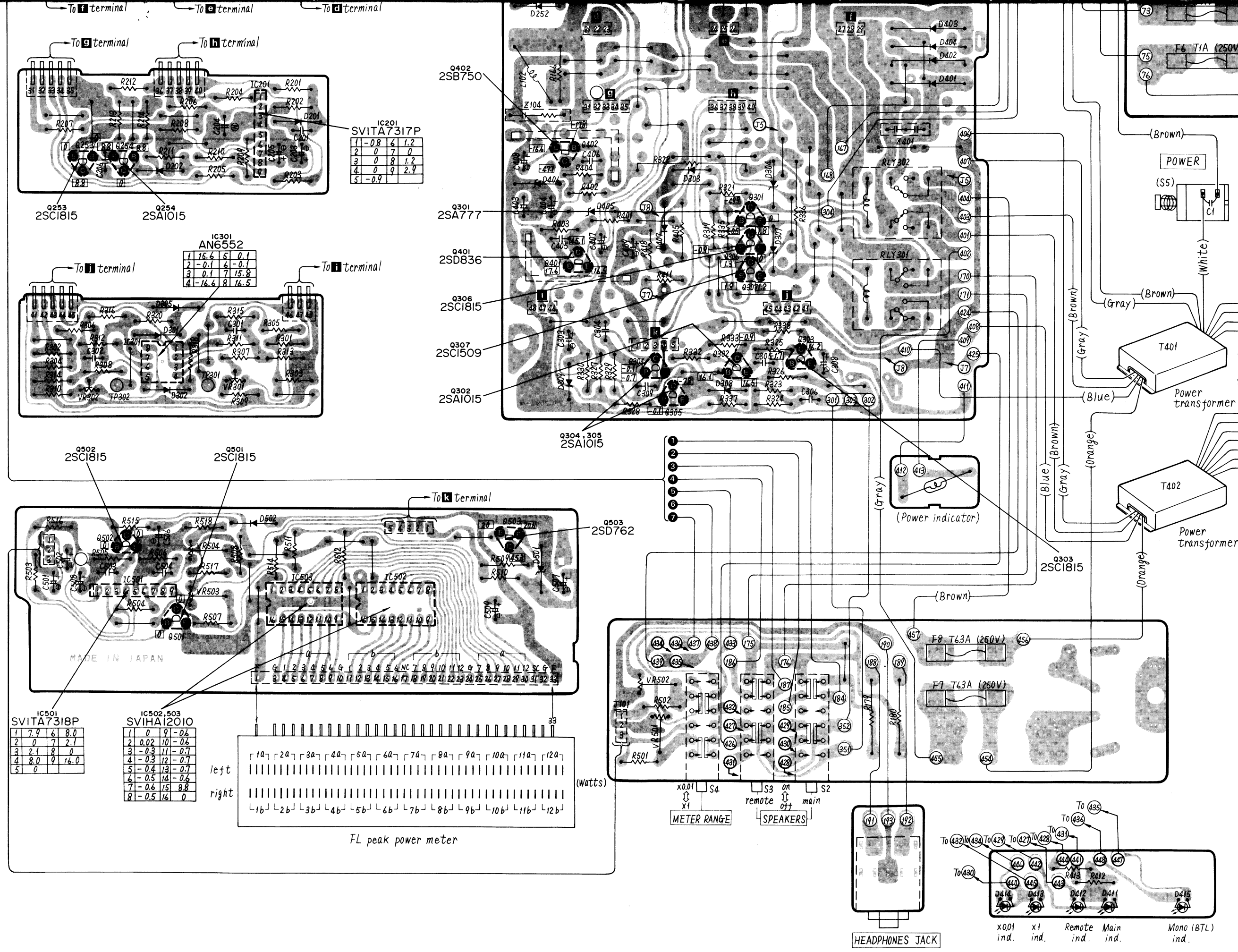


■ CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM

Ground (Earth) lines

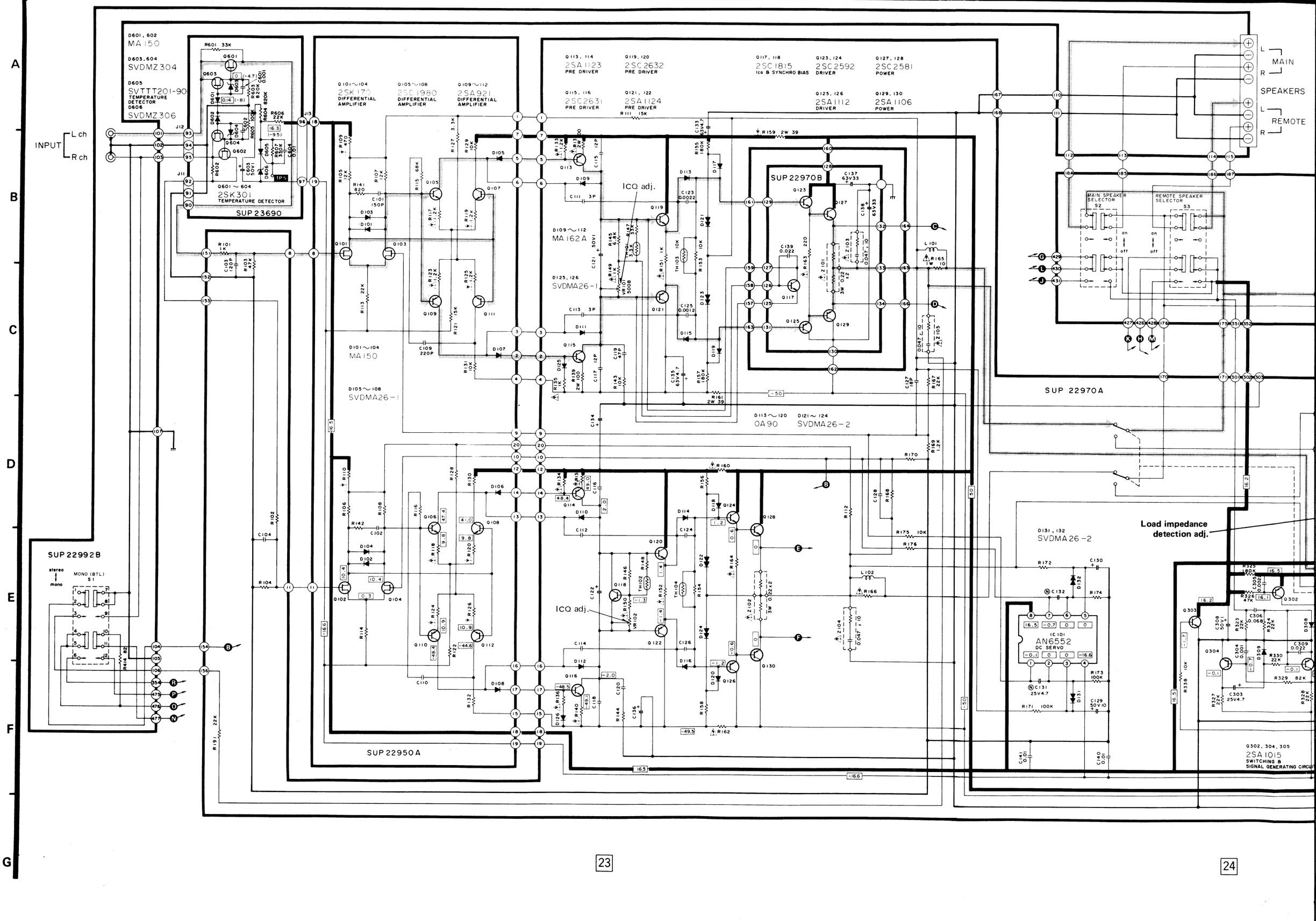



POWER
(SS)
(50/60Hz)
F1 T1A (250V)
F2 T1A (250V)
F3 T1A (250V)
F4 T1A (250V)
F5 T1A (250V)
F6 T1A (250V)
F8 T6.3A (250V)
Power Transformer
T401
T402
(Power indicator)
RLY301
RLY302
IC301 AN6552
IC201 SVIT A7317P
IC501 AN6552
2SC1815
2SA1015
2SC1509
2SB750
2SC1980
2SA1106
2SC2581
2SA1112
2SC2592
2SA1124
2SA777
2SD836
2SD762
To a Terminal
To b Terminal
To c Terminal
To d Terminal
To e Terminal
To f Terminal
To g Terminal
To h Terminal
To i Terminal
To j Terminal
To k Terminal
(Red)
(White)
(Black)
(Yellow)
(Blue)
(Brown)
(Gray)
(Orange)
MADE IN JAPAN


To f terminal
To e terminal
To d terminal
To g terminal
To h terminal
IC201
SVITA7317P
Q253
2SC1815
Q254
2SA1015
IC301
AN6552
To j terminal
To i terminal
Q402
2SB750
Q301
2SA777
Q401
2SD836
Q306
2SC1815
Q307
2SC1509
Q302
2SA1015
Q304, 305
2SA1015
Q502
2SC1815
Q501
2SC1815
To k terminal
Q503
2SD762
IC501
SVITA7318P
IC502, 503
SVIHA12010
left
right
(Watts)
FL peak power meter
D403
D404
D402
D401
F6 T1A (250V)
(Brown)
POWER
(S5)
C1
(White)
(Black)
(Blue)
(Yellow)
(Red)
RLY302
RLY301
(Gray)
T401
Power transformer
T402
(Orange)
(Power indicator)
Q303
2SC1815
F8 T63A (250V)
F7 T63A (250V)
VR502
VR501
R502
R501
S4
x0.01
x1
METER RANGE
S3
remote
on
off
SPEAKERS
S2
main
HEADPHONES JACK
D416
D413
D412
D411
D415
x0.01 ind.
x1 ind.
Remote ind.
Main ind.
Mono (BTL) ind.

21

22


INPUT
L ch
R ch
D601, 602
MA150
D603, 604
SVDMZ304
D605
SVTTT201-90
TEMPERATURE DETECTOR
D606
SVDMZ306
Q601 ~ 604
2SK301
TEMPERATURE DETECTOR
SUP 23690
Q101~104
2SK170
DIFFERENTIAL AMPLIFIER
Q105~108
2SC1980
DIFFERENTIAL AMPLIFIER
Q109~112
2SA921
DIFFERENTIAL AMPLIFIER
Q113, 114
2SA1123
PRE DRIVER
Q119, 120
2SC2632
PRE DRIVER
Q115, 116
2SC2631
PRE DRIVER
Q121, 122
2SA1124
PRE DRIVER
Q117, 118
2SC1815
Icq & SYNCHRO BIAS
Q123, 124
2SC2592
DRIVER
Q125, 126
2SA1112
DRIVER
Q127, 128
2SC2581
POWER
Q129, 130
2SA1106
POWER
ICQ adj.
D109~112
MA162A
D125, 126
SVDMA26-1
D101~104
MA150
D105~108
SVDMA26-1
D113~120
0A90
D121~124
SVDMA26-2
SUP 22970B
SUP 22970A
MAIN
SPEAKERS
REMOTE
MAIN SPEAKER SELECTOR
REMOTE SPEAKER SELECTOR
SUP 22992B
stereo
mono
MONO (BTL)
Load impedance detection adj.
D131, 132
SVDMA26-2
IC101
AN6552
DC SERVO
Q302, 304, 305
2SA1015
SWITCHING & SIGNAL GENERATING CIRCUIT
SUP 22950A

7 8 9 10 11 12 13 14 15 16

SUP 22970A

SUP 22992D

SUP 22992A

SUP 22992C
HEADPHONES

SUP 22970C

SUP 22950C

SUP22950D

SUP 22950B

MAIN SPEAKERS

REMOTE SPEAKERS

MAIN SPEAKER SELECTOR S2

REMOTE SPEAKER SELECTOR S3

METER RANGE SELECTOR S4

D411 ~ 415
LN217RP

FL peak-power meter balance adj.

FL peak-power meter adj.

Load impedance detection adj.

Load impedance detection adj.

Negative voltage line (−50V)

Negative voltage line (−16.6V)

0123, 124
2SC2592
DRIVER

0127, 128
2SC2581
POWER

0125, 126
2SA1112
DRIVER

0129, 130
2SA1106
POWER

IC301
AN6552
VOLTAGE COMPARING

D301, 302, 305
MA150

IC201
SVITA7317P
MUTING/RELAY DRIVE

Q254
2SA1015
HOLD

Q253
2SC1815
HOLD

IC501
SVITA7318P
VOLTAGE AMPLIFIER

Q501, 502
2SC1815
SWITCHING

Q503
2SD762
STABILIZER

D501
SVDMZ320

D502
MA162

D121 ~ 124
SVDMA26-2

D131, 132
SVDMA26-2

IC101
AN6552
DC SERVO

D201, 202
MA150

D251, 252
2SC1980
OVER LOAD DETECTOR

D251, 252
MA162
Negative voltage line (−16.6V)

Q251
Q252

D303, 308, 309
MA150

D304, 307
SVDMZ422B

Q302, 304, 305
2SA1015
SWITCHING & SIGNAL GENERATING CIRCUIT SWITCHING

Q303, 306
2SC1815
RELAY DRIVE

Q307
2SC1509
RELAY DRIVE

Q301
2SA777
RELAY DRIVE

Q401
2SD836
STABILIZER

Q402
2SB750
STABILIZER

D405, 406
SVDMZ318

D401 ~ 404
SVDS3V20
RECTIFIER

D407
SVDSR1K2
RECTIFIER

■ SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

Notes:

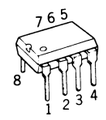
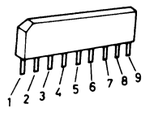
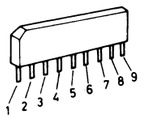
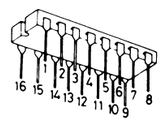
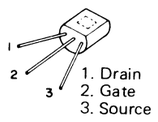
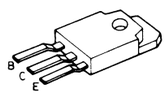
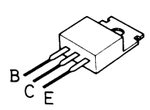
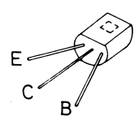
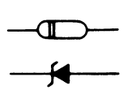
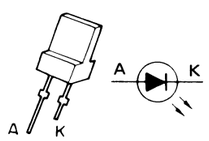
1. Mono (BTL) selector switch in "**stereo**" position.
   Stereo ↔ MONO (BTL)
2. Main speaker selector switch in "**on**" position.
   ▮ on, ▂ off
3. Remote speaker selector switch in "**on**" position.
   ▮ on, ▂ off
4. Meter range selector switch in "**x1**" position.
   ▮ x1. ▂ x0.01
5. Power source switch in "**on**" position.
6. Voltage selector switch in "**220V**" position.
   120V ⟷ 110V ⟷ 220V ⟷ 240V
7. ▭ indicated voltage values are the standard values for the DC electronic circuit tester (high impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
   * Figure in ▭ stand for DC voltage in no signal and no load impedance.
   * Figures in ( ) stand for DC voltage in D605 turned ON.
8. ▭ signal lines of left channel
9. ▬ Positive (+B) voltage lines.
10. Important safety notice:
    Componetns identified by ⚠ mark have special characteristics important for safety.
    When replacing any of these components, use only manufacturer's specified parts.

Continued from page 18

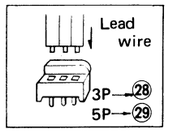
Ref. No.		Part No.	Part Name & Description
R179, 180		ERG2ANJ331	Metal Oxide, 2W, 330Ω, ±5%
R191		**ERD25TJ223**	Carbon, 1/4W, 22kΩ, ±5%
R201		**ERD25TJ333**	Carbon, 1/4W, 33kΩ, ±5%
R202		**ERD25TJ153**	Carbon, 1/4W, 15kΩ, ±5%
R203		**ERD25FJ822**	Carbon, 1/4W, 8.2kΩ, ±5%
R204		**ERD25FJ103**	Carbon, 1/4W, 10kΩ, ±5%
R205		**ERD25TJ823**	Carbon, 1/4W, 82kΩ, ±5%
R206		**ERD25TJ683**	Carbon, 1/4W, 68kΩ, ±5%
R207		**ERD25TJ823**	Carbon, 1/4W, 82kΩ, ±5%
R208		**ERD25TJ333**	Carbon, 1/4W, 33kΩ, ±5%
R209		**ERD25FJ562**	Carbon, 1/4W, 5.6kΩ, ±5%
R210		**ERD25TJ224**	Carbon, 1/4W, 220kΩ, ±5%
R211		**ERD25FJ822**	Carbon, 1/4W, 8.2kΩ, ±5%
R212		**ERD25FJ472**	Carbon, 1/4W, 4.7kΩ, ±5%
R213		**ERD25FJ222**	Carbon, 1/4W, 2.2kΩ, ±5%
R214		**ERD25FJ102**	Carbon, 1/4W, 1kΩ, ±5%
R251, 252		**ERD25FJ222**	Carbon, 1/4W, 2.2kΩ, ±5%
R253, 254		**ERD25FJ471**	Carbon, 1/4W, 470Ω, ±5%
R301, 302		**ERD25FJ332**	Carbon, 1/4W, 3.3kΩ, ±5%
R303, 304		**ERD25FJ470**	Carbon, 1/4W, 47Ω, ±5%
R305, 306		**ERD25FJ682**	Carbon, 1/4W, 6.8kΩ, ±5%
R307, 308		**ERD25TJ394**	Carbon, 1/4W, 390kΩ, ±5%
R309, 310		**ERD25FJ562**	Carbon, 1/4W, 5.6kΩ, ±5%
R311, 312		**ERD25FJ682**	Carbon, 1/4W, 6.8kΩ, ±5%
R313, 314		**ERD25FJ821**	Carbon, 1/4W, 820Ω, ±5%
R315, 316		**ERD25TJ824**	Carbon, 1/4W, 820kΩ, ±5%
R318, 319		**ERD25TJ223**	Carbon, 1/4W, 22kΩ, ±5%
R320, 321		**ERD25TJ223**	Carbon, 1/4W, 22kΩ, ±5%
R322	⚠	ERG3ANJ391	Metal Oxide, 3W, 390Ω, ±5%
R323, 324		**ERD25TJ223**	Carbon, 1/4W, 22kΩ, ±5%
R325		**ERD25TJ184**	Carbon, 1/4W, 180kΩ, ±5%
R326		**ERD25TJ473**	Carbon, 1/4W, 47kΩ, ±5%
R327, 328		**ERD25TJ223**	Carbon, 1/4W, 22kΩ, ±5%
R329		**ERD25TJ823**	Carbon, 1/4W, 82kΩ, ±5%
R330		**ERD25TJ223**	Carbon, 1/4W, 22kΩ, ±5%
R332		**ERD25TJ563**	Carbon, 1/4W, 56kΩ, ±5%
R333		**ERD25TJ823**	Carbon, 1/4W, 82kΩ, ±5%
R335		**ERD25TJ393**	Carbon, 1/4W, 39kΩ, ±5%
R336	⚠	ERG3ANJ391	Metal Oxide, 3W, 390Ω, ±5%
R337		**ERD25TJ223**	Carbon, 1/4W, 22kΩ, ±5%
R338		**ERD25FJ103**	Carbon, 1/4W, 10kΩ, ±5%
R401, 402	⚠	ERD2FCG151	Carbon, 1/4W, 150Ω, ±2%
R403, 404		**ERD25TJ223**	Carbon, 1/4W, 22kΩ, ±5%
R405	⚠	**ERG1ANJ681**	Metal Oxide, 1W 680Ω, ±5%
R411, 412		**ERD25FJ820**	Carbon, 1/4W, 82Ω, ±5%
R413, 414		**ERD25FJ820**	Carbon, 1/4W, 82Ω, ±5%
R418		**ERD25FJ103**	Carbon, 1/4W, 10kΩ, ±5%
R501, 502		**ERD25TJ334**	Carbon, 1/4W, 330kΩ, ±5%
R503, 504		**ERD25TJ333**	Carbon, 1/4W, 33kΩ, ±5%
R505, 506		ERC14GJ226	Solid, 1/4W, 22MΩ, ±5%
R507, 508		**ERD25FJ102**	Carbon, 1/4W, 1kΩ, ±5%
R509	⚠	**ERD50FJ151**	Carbon, 1/2W, 150Ω, ±5%
R510		**ERD25FJ472**	Carbon, 1/4W, 4.7kΩ, ±5%
R511	⚠	**ERD25FJ561**	Carbon, 1/4W, 560Ω, ±5%
R512	⚠	**ERD50FJ391**	Carbon, 1/2W, 390Ω, ±5%
R514	⚠	**ERD25FJ100**	Carbon, 1/4W, 10Ω, ±5%
R515		**ERD25TJ223**	Carbon, 1/4W, 22kΩ, ±5%
R516		**ERD25FJ562**	Carbon, 1/4W, 5.6kΩ, ±5%
R517, 518		**ERD25FJ471**	Carbon, 1/4W, 470Ω, ±5%
R601, 602		**ERD25TJ333**	Carbon, 1/4W, 33kΩ, ±5%
R603, 604		**ERD25TJ824**	Carbon, 1/4W, 820kΩ, ±5%
R605		**ERD25TJ104**	Carbon, 1/4W, 100kΩ, ±5%
R606		**ERD25TJ223**	Carbon, 1/4W, 22kΩ, ±5%
R607		**ERD25TJ334**	Carbon, 1/4W, 330kΩ, ±5%
CAPACITORS			
C1	⚠	ECKDKC103PF	Ceramic, 400VAC, 0.01μF, $\pm^{100}_{0}$%
C2 [EG] only	⚠	ECQE2A473M	Polyester, 250VAC, 0.047μF, ±20%
C101, 102		**ECCD1H151K**	Ceramic, 50V, 150pF, ±10%
C103, 104		**ECCD1H121K**	Ceramic, 50V, 120pF, ±10%
C109, 110		**ECKD1H221KB**	Ceramic, 50V, 220pF, ±10%
C111, 112		**ECCD1H030CC**	Ceramic, 50V, 3pF, ±0.25pF
C113, 114		**ECCD1H030CC**	Ceramic, 50V, 3pF, ±0.25pF
C115, 116		**ECCD2H120K**	Ceramic, 500V, 12pF, ±10%
C117, 118		**ECCD2H120K**	Ceramic, 500V, 12pF, ±10%
C119, 120		**ECCD1H470K**	Ceramic, 50V, 47pF, ±10%
C121, 122		**ECEA50Z1**	Electrolytic, 50V, 1μF
C123, 124		**ECQM1H222JZ**	Polyester 50V, 0.0022μF, ±5%
C125, 126		**ECQM1H122JZ**	Polyester, 50V, 0.0012μF, ±5%
C127, 128		**ECCD1H180KC**	Ceramic, 50V, 18pF, ±10%
C129, 130		**ECEA1HS100**	Electrolytic, 50V, 10μF
C131, 132	⚠	**ECEA25N4R7**	Non-polar Electrolytic, 25V, 4.7μF
C133, 134		**ECEA1JS4R7**	Electrolytic, 63V, 4.7μF
C135, 136		**ECEA1JS4R7**	Electrolytic, 63V, 4.7μF

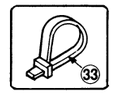
Ref. No.		Part No.	Part Name & Description
C137, 138		**ECEA1JS330**	Electrolytic, 63V, 33μF
C139		**ECKD1H223ZF**	Ceramic, 50V, 0.022μF, $\pm^{80}_{20}$%
C140, 141		**ECKD1H103ZF**	Ceramic, 50V, 0.01μF, $\pm^{80}_{20}$%
C201		**ECKD1H102MD**	Ceramic, 50V, 0.001μF, ±20%
C203		ECEA2AG3R3	Electrolytic, 100V, 3.3μF
C204	⚠	ECEA1CN101S	Non-Polar Electrolytic, 16V, 100μF
C205		ECEA1EG330S	Electrolytic, 25V, 33μF
C206		**ECEA50Z1**	Electrolytic, 50V, 1μF,
C301, 302		**ECQM1H473JZ**	Polyester, 50V, 0.047μF, ±5%
C303		**ECEA50Z4R7**	Electrolytic, 50V, 4.7μF
C304		**ECKD1H102MD**	Ceramic, 50V, 0.001μF, ±20%
C305		**ECKD1H222MD**	Ceramic, 50V, 0.0022μF, ±20%
C306		**ECQM1H683JZ**	Polyester, 50V, 0.068μF, ±5%
C308		**ECEA50Z1**	Electrolytic, 50V, 1μF
C309		**ECKD1H223ZF**	Ceramic, 50V, 0.022μF, $\pm^{80}_{20}$%
C401, 402		ECETS56V103U	Electrolytic, 56V, 10000μF
C403, 404		ECEA1EG330S	Electrolytic, 25V, 33μF
C405, 406		**ECKD1H223ZF**	Ceramic, 50V, 0.022μF, $\pm^{80}_{20}$%
C407		**ECEA1ES101**	Electrolytic, 25V, 100μF
C408		ECEA1EG101S	Electrolytic, 25V, 100μF
C409		**ECEA1ES101**	Electrolytic, 25V, 100μF
C501, 502		**ECEA50ZR47**	Electrolytic, 50V, 0.47μF
C503, 504		**ECQM1H473JZ**	Polyester, 50V, 0.047μF, ±5%
C506		**ECEA2AS3R3**	Electrolytic, 100V, 3.3μF
C507		**ECEA1VS330**	Electrolytic, 35V, 33μF
C508		**ECEA50ZR47**	Electrolytic, 50V, 0.47μF
C509		**ECEA1ES470**	Electrolytic, 25V, 47μF
C601, 602		**ECKD1H102MD**	Ceramic, 50V, 0.001μF, ±20%
C603		**ECEA50Z1**	Electrolytic, 50V, 1μF
C604		**ECKD1H103ZF**	Ceramic, 50V, 0.01μF, $\pm^{80}_{20}$%

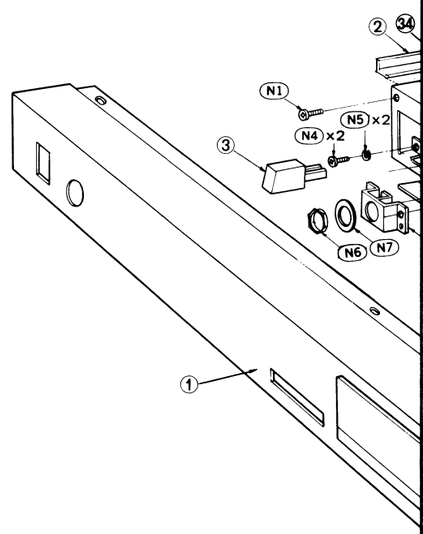
• Terminal guide of transistors, diodes and IC's

AN6552F	SVITA7317P	SVITA7318P
		
SVIHA12010	**2SK170-GR, 2SK301-S**	**2SC2581, 2SA1106**
	 1. Drain 2. Gate 3. Source	
2SC2592, 2SA1112 2SD836, 2SB750 2SD762	**2SC1980, 2SA921, 2SA1123, 2SC2631, 2SC1815, 2SC2632, 2SA1124, 2SA1015, 2SA777, 2SC1509**	
		
SVDMZ □ □ □	**LN217RP**	
		

■ EXPLODED VIEWS

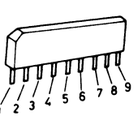
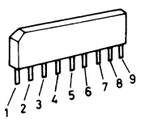
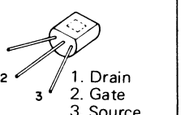
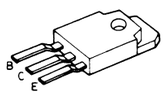
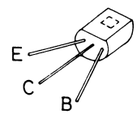
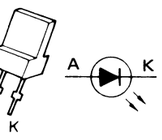




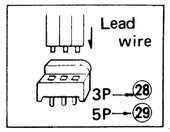


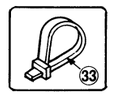
Part No.	Part Name & Description
EA1JS330	Electrolytic, 63V, 33μF
KD1H223ZF	Ceramic, 50V, 0.022μF, +80 −20 %
KD1H103ZF	Ceramic, 50V, 0.01μF, +80 −20 %
KD1H102MD	Ceramic, 50V, 0.001μF, ±20%
EA2AG3R3	Electrolytic, 100V, 3.3μF
EA1CN101S	Non-Polar Electrolytic, 16V, 100μF
EA1EG330S	Electrolytic, 25V, 33μF
EA50Z1	Electrolytic, 50V, 1μF,
QM1H473JZ	Polyester, 50V, 0.047μF, ±5%
EA50Z4R7	Electrolytic, 50V, 4.7μF
KD1H102MD	Ceramic, 50V, 0.001μF, ±20%
KD1H222MD	Ceramic, 50V, 0.0022μF, ±20%
QM1H683JZ	Polyester, 50V, 0.068μF, ±5%
EA50Z1	Electrolytic, 50V, 1μF
KD1H223ZF	Ceramic, 50V, 0.022μF, +80 −20 %
ETS56V103U	Electrolytic, 56V, 10000μF
EA1EG330S	Electrolytic, 25V, 33μF
KD1H223ZF	Ceramic, 50V, 0.022μF, +80 −20 %
EA1ES101	Electrolytic, 25V, 100μF
EA1EG101S	Electrolytic, 25V, 100μF
EA1ES101	Electrolytic, 25V, 100μF
EA50ZR47	Electrolytic, 50V, 0.47μF
QM1H473JZ	Polyester, 50V, 0.047μF, ±5%
EA2AS3R3	Electrolytic, 100V, 3.3μF
EA1VS330	Electrolytic, 35V, 33μF
EA50ZR47	Electrolytic, 50V, 0.47μF
EA1ES470	Electrolytic, 25V, 47μF
KD1H102MD	Ceramic, 50V, 0.001μF, ±20%
EA50Z1	Electrolytic, 50V, 1μF
KD1H103ZF	Ceramic, 50V, 0.01μF, +80 −20 %

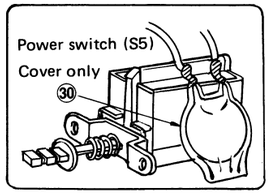
ors, diodes and IC's

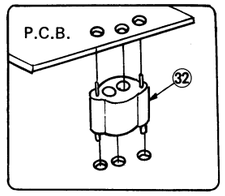
SVITA7317P	SVITA7318P
	
170-GR, 2SK301-S	2SC2581, 2SA1106
	
2SC1980, 2SA921, 2SA1123, 2SC2631, 2SC1815, 2SC2632, 2SA1124, 2SA1015, 2SA777, 2SC1509	
	
LN217RP	
	

■ EXPLODED VIEWS



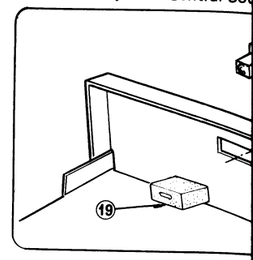


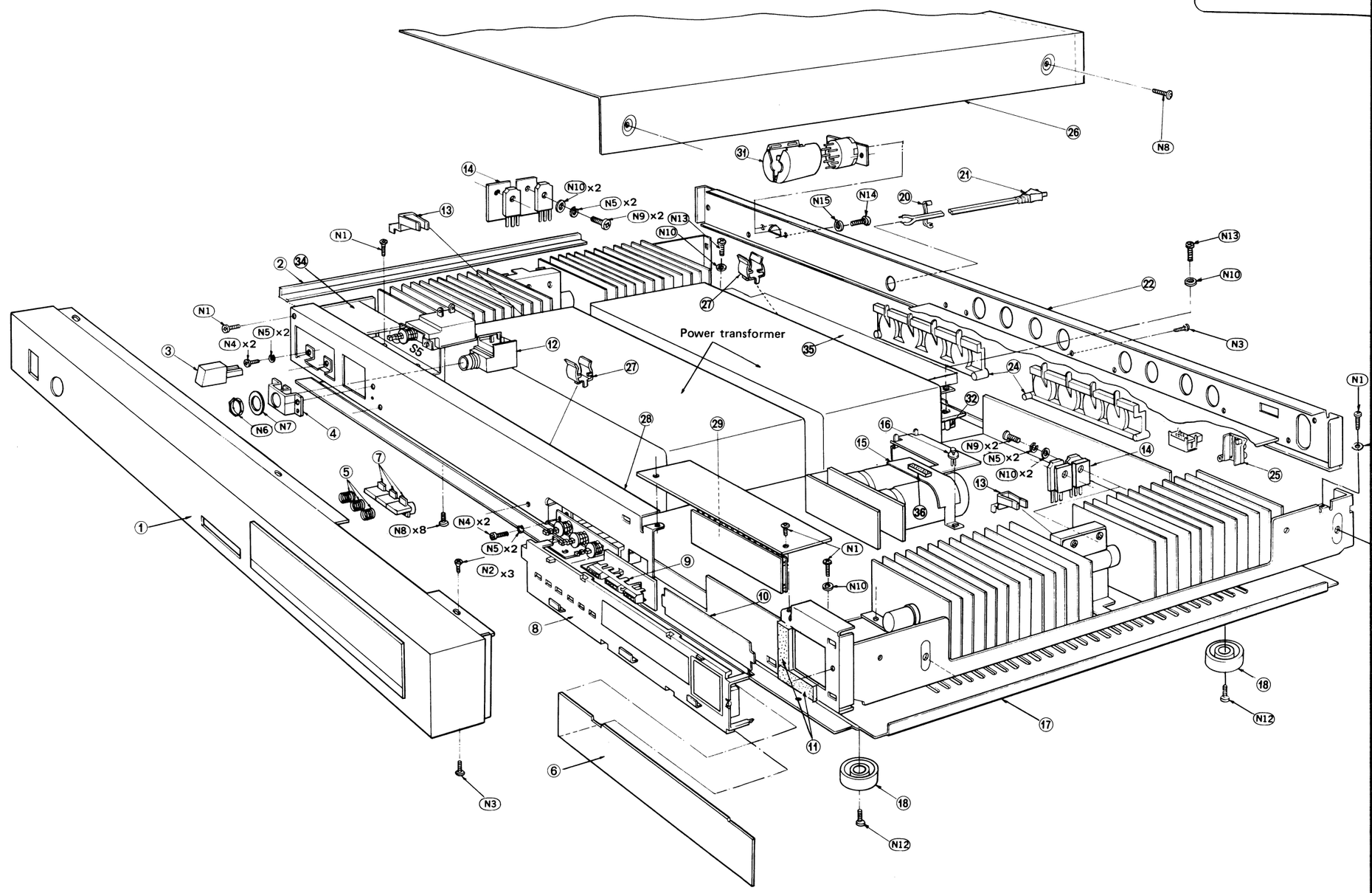




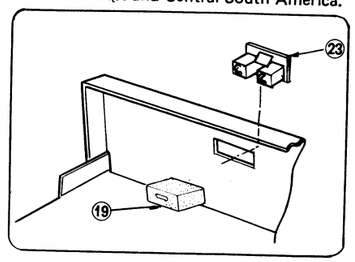
(Rear Panel and AC Outlet) .

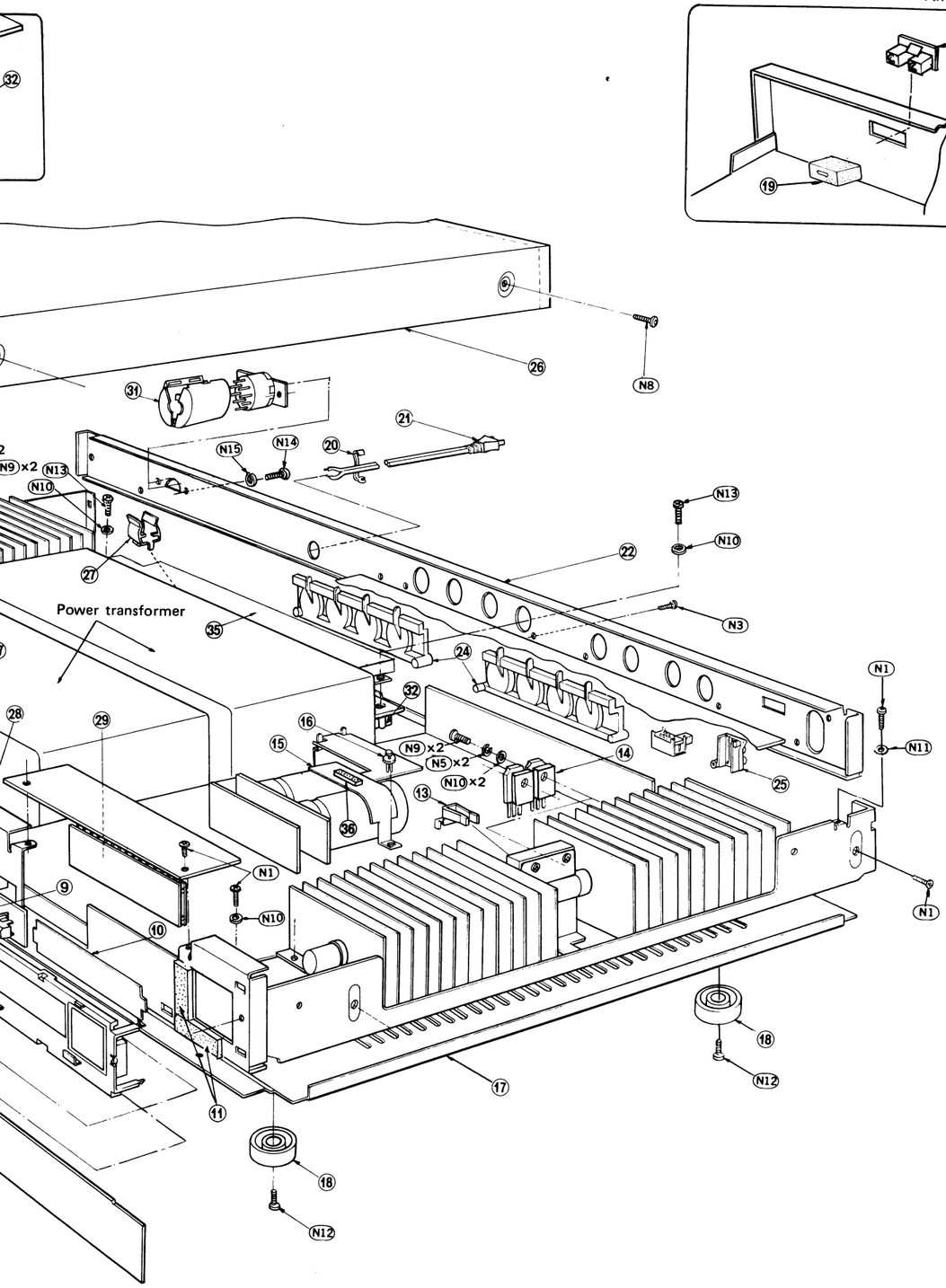
Available in Southeast Asia, Ocea
Middle Near East and Central So





(Rear Panel and AC Outlet) . . . for [XA]
Available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.





■REPLACEMENT PARTS LIST

..... Cabinet & Chassis Parts

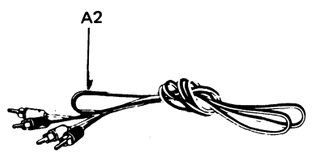
Notes:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
3. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.

Areas

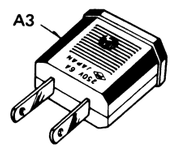
* [D] is available in Scandinavia.
* [EW] is available in United Kingdom.
* [EG] is available in F.R. Germany.
* [EK] is available in United Kingdom.
* [EF] is available in France.
* [EH] is available in Holland.
* [EB] is available in Belgium.
* [Ei] is available in Italy.
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
* [XL] is available in Australia.

Ref. No.		Part No.	Part Name & Description
CABINET and CHASSIS PARTS			
1		SGWEA7KM	Front Panel Ass'y
2		SGX6937–7	Arnament
3		SBC337	Button, Power Source
4		SMN1793	Bracket, Head Phone
5		SUS257	Spring, Speakers & Meter Range
6		SGU241	Filter, FL
7		SBC413	Button, Speakers & Meter Range
8		SGXEA7KM	Plate, Display Window
9		SMP315	Cover, LED
10		SDU89	Filter, LED
11		SHG6219	Cushion, FL
12		XCJS6P21B–A1	Jack, Head Phone
13		SUS243	Bracket
14		SMX497	Sheet, Heat Sink (Insulating)
15		SUW1819	Bracket
16		SHR401–1	Pin, PCB
17 [D, EW]		SKUEA7KD	Bottom Board
17 [XL]		SKUEA7KXL	Bottom Board
17 Other Areas		SKUEA7KEK	Bottom Board
18		SKL197–1	Foot
19 [XA] only		SMX13–1	Cover, AC Socket
20 [EK]		SHR129	Bushing, AC Cord
20 [XL]		SHR131	Bushing, AC Cord
20 Other Areas		SHR127	Bushing, AC Cord
21 [EW, XA]	⚠	SJA111	AC Cord
21 [EK]	⚠	RJA45YA	AC Cord
21 [XL]	⚠	**QFC1207MA**	AC Cord
21 Other Areas	⚠	**SJA97**	AC Cord
22 [XA]		SGP2811–1B	Rear Panel
22 [XL]		SGP2811–2B	Rear Panel
22 Other Areas		SGP2811B	Rear Panel
23 [XA] only	⚠	SJS9221	Socket, AC Outlet
24		SJF4427–2	Terminal Board, Speaker
25		SJF3225–2N	Terminal Board, Input
26		SKC710B1	Cabinet
27		SJT347	Fuse Crip
28		SJS5327	Socket (3P)
29		SJS5519	Socket (5P)
30		SMXA65	Cover, Line Capacitor
31		SUV453	Cover, Voltage Adjuster
32		SHE75	Clamper, PCB
33		SHR301	Clamper, Pointer
34		SMX363	Cover, Power
35		SMX527	Cover, PCB
36		SHG6025	Rubber, Cushion
SCREWS, WASHERS and NUTS			
N1		**XTB3+8BFN**	Screw, Tapping ⊕ 3 x 8
N2		**XTS3+8B**	Screw, Tapping ⊕ 3 x 8
N3		XTBS3+8BFZ1	Screw, Tapping ⊕ 3 x 8
N4		**XSN3+6S**	Screw, ⊕ 3 x 6
N5		**XWA3B**	Washer, Spring ϕ3
N6		**XNS12**	Nut, Head Phone
N7		SNE59–1	Washer, Head Phone
N8		XTB4+6BFZ	Screw, Tapping ⊕ 4 x 6
N9		**XSN3+10S**	Screw, ϕ3
N10		**XWG3**	Washer, Plain ϕ3
N11		**XWC3B**	Washer, External Toothed Lock ϕ3
N12		**XTB3+10BFZ**	Screw, Tapping ⊕ 3 x 10
N13		XTV3+8BFN	Screw, Tapping ⊕ 3 x 8
N14		**XSN3+6BVS**	Screw, 3X6
N15		**XWA3BFZ**	Washer, ϕ3
ACCESSORIES			
A1 [EK, XL]		SQF10951–1	Instructions Book
A1 [XA]		SQF10949–1	Instructions Book
A1 [EG]		SQF11097–1	Instructions Book
A1 [Ei]		SQF11099–1	Instructions Book
A1 Other Areas		SQF10953–1	Instructions Book
A2		SJP2129–5	Plug, Stereo PIN Connection Cord
A3 [XA] only	⚠	SJP5213–1	Plug, Adapter, AC Power
A4 [XA] only	⚠	SJP5215	Plug, Adapter, AC Power
PACKING PARTS			
P1		SPG3313	Carton Box
P2		SPS3307	Pad, Lower
P3		SPS3309	Pad, Upper Front
P4		SPS3311	Pad, Upper Rear
P5		SPS3313	Pad, Upper Center

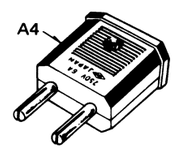
● **Accessories**



[XA] area only



[XA] area only



Printed in Japan
81099000 ® SH/IM